

# BULLETIN OF MISCELLANEOUS INFORMATION No. 1, 1937 ROYAL BOTANIC GARDENS, KEW

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## I — ECOLOGICAL METHODS IN THE STUDY OF NATIVE AGRICULTURE IN NORTHERN RHODESIA. C. G. TRAPNELL.

### INTRODUCTION

The ensuing short account is a review of principles which have emerged in the course of an attempt to apply ecological methods to the study of native agriculture in Northern Rhodesia. The Ecological Survey of Northern Rhodesia was inaugurated in June of 1931 by Professor R. S. Adamson of Capetown University, and staffed by an Ecologist and an Agricultural Officer. It had as its objects the determination and mapping of types of country in terms of their vegetation cover, the study of existing agriculture and the natural products found within these types of country, and in particular the provision of a basis for native agricultural development. There was no precedent for a large scale survey of this type, and the principles of its working had to be found rather than applied.

Three types of survey might have been employed for the purpose of agricultural study in this territory. A large scale soil survey would have provided information on the environmental factors of primary importance in determining variations in agricultural practice and potentialities. It would, however, have been slow and expensive in operation by reason of the need for a very large number of analytical determinations of variations in soil fertility: or alternatively, had it been conducted on the basis of profile observation and field classification without these analyses, would have failed to provide all the requisite information. A method of regional survey, or the geographic surveys made in the United States, would have brought into consideration all external factors, but would have been considerably handicapped by the lack of soil survey or of available geological survey, and also by the absence of pronounced topographic variation over much of the territory. Vegetation survey theoretically provided a means of integration of these factors and if conducted with due allowance for climatic variation and for changes induced by biotic factors, was held to provide the quickest efficient means of land classification. This method was employed, with full regard to the fact that it was necessary to ascertain at the same time the amount and type of soil study necessary.

A survey of this type involves either the hypothesis of a direct correlation of vegetation type with agricultural practice and potentialities, or that of a correlation of vegetation with soil type or

fertility as analytically determined, and thereby with agricultural potentialities. In an initial detailed survey of 13,000 square miles of the lower Kafue basin, both hypotheses were tested. The first received immediate support from the native, for it was found that he recognised, and employed in the selection of his cultivation sites, the same types of bush or other plant indicators as those which the survey would employ, and had a definite, if ill-formulated, conception of differences in fertility which they indicated. These differences were made evident, in addition, by the different crops employed in each type by native and European, and their varying growths and yields. This aspect is discussed later. The correlation between vegetation type and soil fertility was also to have been tested analytically, but the work was terminated by the retrenchment of the soil chemist of the agricultural department at a point when promising results were being obtained. Independent field observations on soil derivation and profile were, however, kept, which have now resulted in a soil classification, primarily upon a physiographic basis, which answers closely in its main types to that approved for the East African Soil Map at the recent conference of Soil Chemists at Zanzibar.

It is necessary first to consider the degree of correlation obtained between soil and vegetation type, the reasons for lack of correlation where found, and the type of mapping unit which emerges as desirable for agricultural purposes. The rest of this paper is concerned with agricultural aspects.

#### MAIN SOIL GROUPS.

For the purpose of considering their relationship to the vegetation, the soils of north-western Rhodesia may be divided into six main groups whose distribution is shown approximately on the accompanying sketch map (no. 1) :

(1) *Kalahari group* of deep loose desert sands of late tertiary age covering the western or Barotseland half of the old peneplane at an altitude of 3,000 to 4,000 feet and more.

(2) *Northern Plateau group* of clayey eluvial soils, typically with a horizon of ironstone nodules, occupying the northern half of the modified peneplane on pre-Karoo rocks at an altitude of 3,500 feet to 4,500 feet under a rainfall of 40-50 inches.

(3) *Southern Plateau group* of sandy eluvial soils, again typically with a horizon of ironstone nodules and of derivation similar to the last, but physically distinct. They lie mainly on archaean rocks at an altitude of 3,000 to 4,000 feet under a rainfall of 30 to 40 inches.








(4) *Upper Valley group* of sandy soils of a relatively immature residual or colluvial type, occupying the margins of the dissected peneplane particularly on calcareous formations about the lower Kafue basin. They are found under a rainfall similar to the last but tend to a rather lower altitude.


(5) *Lower Valley group* of gravels, sands and clayey sand soils, with a tendency to a horizon of lime concretions. They occupy the



# MAIN RAINFALL ZONES AND SOIL REGIONS.



- |                             |   |
|-----------------------------|---|
| KALAHARI SANDS.....         |  |
| NORTHERN PLATEAU SOILS..... |  |
| SOUTHERN PLATEAU SOILS..... |  |
| UPPER VALLEY SOILS.....     |  |
| LOWER VALLEY SOILS.....     |  |
| ALLUVIAL PLAIN SOILS.....   |  |
| ESCARPMENT HILL SOILS.....  |  |



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trough of the lower Zambesi valley on Karroo beds mainly between 1,000 and 2,000 feet, but Karroo basaltic gravels ascend to 3,000 feet by the Victoria Falls. Rainfall may be placed at 20 to 30 inches.

(6) *Alluvial Plain group* of grey and black clays with a pronounced horizon of calcareous concretions, occupying the past and present day flood plains. Sandier and more peaty soils free of concretions are found in the Barotse Plain.

As explained, these soils have only received analytical study in the case of the Southern Plateau and Upper Valley soils about the lower Kafue basin. Such analyses as were completed indicated that the Upper Valley soils collectively were less leached and possessed a higher phosphate and nitrogen content than the Plateau soils, while more liable to compaction and erosion. They are divided into poorer mainly residual "Transitional" soils and more fertile colluvial "Thorn" belts which form the best maize lands in north western Rhodesia.

#### VEGETATION—SOIL RELATIONSHIP.

The relationship of vegetation types to the main soil groups may be outlined broadly as follows :

(1) Dense evergreen *Cryptosepalum* woodland or forest with a distinctive Angolan flora is restricted to the northern and upland Kalahari sands and appears to be endemic to them. It has been invaded from the east by *Brachystegia* and *Isoberlinia* as noted below, but retains its own distinct seral phases.

(2) *Baikiaea* semi-deciduous woodland and forest with *Burkea* seral phases occupies the same position on the southern and lowland sands. Dense *Baikiaea* forest of commercial size, with seral or understory *Acacia* and *Combretaceae* marks a distinctive class of "Transitional" sands with a high pH and fertility of maize standard.

(3) Northern deciduous woodlands of *Brachystegia* spp. with *Isoberlinia*, *Uapaca* and locally *Marquesia*, characterised for soil purposes by association with *Brachystegia floribunda*, answer to the Northern Plateau soils in distribution. A distinctive class of dense high *B. longifolia* woodlands often marks ferruginous red earths on calcareous formations within this group.

(4) *Isoberlinia paniculata* and to a lesser extent *Brachystegia mpalensis* and *B. longifolia* occupy an anomalous position in that they have invaded a vast area of the eastern and upland Kalahari sands. In particular much of the distribution of *I. paniculata* woodland is hard to explain except on the assumption of a mass invasion which is still in progress.

(5) Southern *Brachystegia-Isoberlinia* and *Isoberlinia-Uapaca* woodland occupies the Southern Plateau soils with the exception that *Brachystegias* and the normal *Isoberlinia globifera* are replaced by *I. paniculata* towards the north on poor sandy soils with a marked ironstone horizon. Better soils approaching those of the next type are occupied by *B. mpalensis* or *B. spiciformis*.

(6) Floristically distinct from the Plateau *Caesalpineae* and the Angolan types of the sands is a deciduous scrub-woodland of *Combretaceae* with climax *Papilionaceae* and semi-relict thickets of *Canthium*, *Dalbergia*, etc., which passes into *Acacia* tree-grassland on fertile colluvial soils. This association with its varied seral phases appears to be directly correlated with the occurrence of Upper Valley soils. The fertility differences between its *Acacia* (Thorn soil) and *Combretaceae* (Transitional) variants and the *Brachystegia* woodlands of the Southern Plateau soils have already been noted.

(7) On Lower Valley soils of a class approaching the last (residual and colluvial chestnut sands) the Combretaceous community is replaced by dense deciduous *Commiphora* scrub, while *Acacia* is practically restricted to alluvium. The difference between this and the last type is by no means entirely climatic for the Combretaceous and *Commiphora* types are found at inappropriate altitudes where soils of suitable derivation occur.

(8) *Copaifera Mopane* occupies Karroo Valley soils of a highly erodible type and appears to be invading the last with the assistance of erosion. Mixed *Copaifera-Commiphora* vegetation is found on the higher gravels, and *Copaifera* is also dominant on old alluvial clays of pedocal type in the Machili and Nanzhila depressions.

(9) Alluvial Plain soils other than those of the Machili and Nanzhila depressions are under grassland. To these should be added the remarkable seasonal swamp-grasslands on the flat water-sheds of west Barotseland.

#### CHOICE OF MAPPING UNITS.

It will be seen that within certain climatic limits there exists a general correlation between floristically distinct vegetation types and soils of different classes in respect of their derivation and history. The reasons for this are as yet inadequately understood, and discussion of what reasons have been inferred and their bearing on the climatic climax view of vegetation types would occupy more time than is here permissible. The main exceptions to this correlation appear to be due to mass invasions by certain species of *Caesalpineae* which find support in Henkel's observations of invasion of *Baikiaea* sand forests by *Brachystegia-Isobertia* in Southern Rhodesia. Apart from these exceptions it becomes possible to employ for mapping purposes vegetation-soil units which are significant for agricultural purposes and, as will be seen, particularly suitable for the study of native agriculture. In practice selection of types has been made with regard to their agricultural significance, and where the agricultural objective has required that greater or less importance be attached to either vegetational or soil aspects, the type has been selected accordingly. Thus, although not all of one kind, the *Cryptosepalum* woodlands and forests require to be separated as one unit irrespective of variations in their sand, because of their direct influence on the distribution of certain types of



# MAIN VEGETATION - SOIL UNITS.



## KALAHARI TYPES

CRYPTOSEPALUM sands.....	
Northern BRACHYSTEGIA- ISOBERLINIA sands.....	
Southern ISOBERLINIA sands.....	
BAIKIAEA - BURKEA sands.....	
BAIKIAEA Transitional sands.....	
Watershed swamp sands.....	

## NORTHERN PLATEAU TYPES

## SOUTHERN PLATEAU TYPES

(Escarpment Hill country).....

## UPPER VALLEY TYPES

## LOWER VALLEY TYPES

## ALLUVIAL PLAIN TYPES

Alluvial grasslands.....	
COPAIFERA MOPANE clays.....	

Correction.—The blank square in the right hand column should be omitted.





cassava and bullrush millet (*Pennisetum*) cultivation. By contrast the dense commercial *Baikiaea* forests and certain *Burkea*, *Terminalia* and *Acacia* variations associated with them have been combined as one unit because they collectively occupy the Transitional Sands which are suitable for native maize cultivation.

Where the soil-vegetation relationship has been obscured by the processes of invasion already alluded to, soil and climatic factors have been given primary importance. Thus *Brachystegia-Isoberlinia* woodlands on the Kalahari Sands have been differentiated from those on the Southern or Northern Plateau soils, while upon climatic grounds the Northern *Brachystegia-Isoberlinia* woodlands of the sands, with *B. longifolia* associated, have been differentiated from the Southern *Isoberlinia* sand woodlands without this species. The classification of these monotonous woodlands is bound to be somewhat arbitrary. In general it is necessary for practical purposes to employ units which are single, composite or partial vegetation types, defined with regard to their soil relationship, or combined or subdivided as ascertainable soil differences and the agricultural objects require. A simplified map of types here relevant is given (no. 2).

A method of survey in which vegetation is given primary importance in the differentiation of type of country makes for the greatest ease and rapidity of mapping. It allows of the use of native information, for the native can define the forests where he cannot define the soil; he can also supply much information in advance of a traverse which will greatly facilitate sampling. But most important for present purposes is the fact that a modified vegetational method provides a land classification which is immediately applicable to native agricultural practice.

#### NATIVE LAND SELECTION.

The reason for this lies in the native's method of land selection. Certain trees and grasses, or a certain type of bush, are recognised, normally intuitively and without conscious thought, as indicating good land for the staple crop or for the various types of garden made. Selection for soil fertility is general, but there are exceptions to this among certain forest tribes who rely for fertility on the ash of the trees which they fell to make their gardens and who may haul in brushwood from an area much larger than that cultivated in order to obtain the requisite supply. This primitive stage persists among the Kaonde and allied tribes of the Northern Plateau region. Their tradition, and possibly a general deficiency in the soil, requires heavy fertilising with wood ash, and they have remained content with the selection of stands of timber convenient for cutting, commonly using poor forest on poorer soil than they could obtain. A stage once removed from that of the Kaonde is found in certain tribes of the Lunda-Luvale group on the Kalahari sands of north Barotseland. Climax forest of certain trees, notably *Cryptosepalum*

*pseudotaxus*, is selected, primarily because the tree gives a dense brushwood for ash for bullrush millet cultivation, but also because climax forest soil is recognised as good. The advanced Luchaze, referred to later, indicate this by saying that they choose *Cryptosepalum* forest with the moss *Leucobryon dimorphodictyon* which covers the forest floor in the climax phase.

A more definite use of trees and grasses as indicators of soil fertility is found among tribes outside these two groups. The fertilising effect of the ash is treated as incidental to the making of the bush garden, or, as among the Lenje and Tonga on the Southern Plateau soils, deliberate ash fertilising is retained for certain crops which require it. Apart from this, the main and subsidiary gardens are selected for soil fertility. The most important indicators are various species of *Acacia*, notably *A. campylacantha* among the Ila and Tonga of the upper valley region, and of the grass *Hyparrhenia*, such as *H. Ruprechtii*. While the sites are recognised intuitively, the indicator will be readily named in response to questioning and the same answer will be given in village after village. Regard is also had to soil colour, but not to this alone. Among the Ila-Tonga group indicators of both good and bad soil begin to be recognised and the crop for which the soil under a particular type of bush is suitable, the period for which it can be worked and even the phase in the succession at which it can be returned to are known. Finally the most advanced stage is represented by the methods of the Luyi or Rozi group of tribes in and about the central Barotse Plain in the Kalahari region. These people have a highly developed system of small gardens in grassland, and the various sites and combinations of these gardens are determined by a series of indicator grasses which have come to be used not only consciously but also traditionally for recognition of the sites.

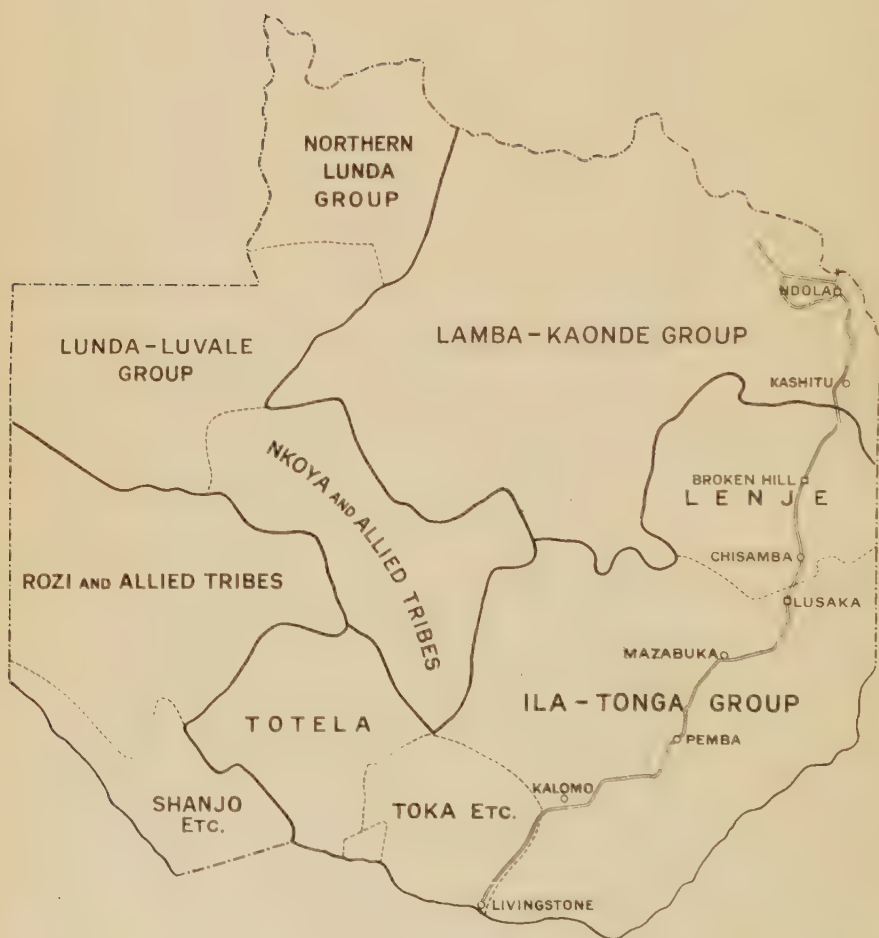
A full discussion of this "Luyi code" of land selection would require a separate paper, but it may be used as an extreme example of the fact that native principles of land selection cannot be understood without ecological study of the country. The sites are placed in grassland which varies in composition according as the soils range between acid sand, seepage peat, basic clay loam and swamp peat. Through these grasslands are distributed raised wet season gardens and sunk dry season gardens for maize and kaffir corn, drained seepage gardens for winter maize, tara and other characteristic crops, subsoiled sweet potato and cassava gardens, etc. There is an appearance of complete confusion of method until the various garden types are worked out in relation to the zonation of the grasslands and the soil and moisture variations which they indicate. Without further instances it can be said that in north western Rhodesia the native's land selection and therefore the types of garden which he makes, cannot be fully understood until his sites are studied and discussed with him from an ecological standpoint.





## MAIN TRIBAL GROUPS

(AFTER OFFICIAL TRIBAL MAP OF NORTHERN RHODESIA)





## NATIVE AGRICULTURAL SYSTEMS.

With this precision of land selection is associated an admirable adaptation of agricultural systems to their environment, as constituted by the type of soil and forest occupied. This applies particularly to the distribution of staple crops and to the broad lines of agricultural practice. Agricultural practice is, of course, largely determined by tradition, but tradition itself reflects past environment, and when a tribe has been long settled in its country its tradition complies with its requirements. It has thus been found that, except in cases of recent immigration, the extent of a given agricultural system can be defined by a vegetation-soil unit.

It is again impossible to go into the detail of this relationship for the 30 or 40 tribes concerned in north western Rhodesia. But the main systems, excluding some of tribes of intermediate position along the Kalahari contact, are summarised here for comparison with the soil and vegetation types previously described. These systems or groups of systems may be classified broadly as :

(1) *The Northern Kalahari Forest System* of the southern section of the Lunda and the Luvale group of tribes with cassava and bullrush millet the normal chief crops, answering to the northern zone of mixed *Cryptosepalum* and *Brachystegia-Isobertia* sands.

(2) *The Southern Kalahari Woodland System* of the Totela with bullrush millet the main crop and other cereals subsidiary, answering to the southern *Isobertia* sands.

(3) *The Southern Kalahari Thicket System* of the Shango and other southern Sikololo-speaking tribes with maize normally the chief crop and bullrush millet subsidiary, answering to the southern zone of *Baikiaea* Transitional sands.

(4) *The Central Kalahari Plains System* of the Luyi or Rozi group of Sikololo speaking tribes with maize and locally kaffir corn staple crops but cassava bush-cultivation also adopted, answering to the Barotse Plain and a surrounding region with plains sites in the central loose sands.

(5) *The Northern Kalahari Contact System* of the northern Lunda group and adjoining Luba, with cassava and finger millet chief crops, occupying contact soils under mixed *Brachystegia* adjoining the northern Kalahari region.

(6) *The Northern Plateau Forest System* of the Lamba-Kaonde group of tribes with kaffir corn cultivation on an ash-fertilising tradition probably derived from ancestral finger millet cultivation, answering to the Northern Plateau soil zone of *Brachystegia floribunda*.

(7) *The Southern Plateau Woodland System* of the Lenje, Plateau Tonga and others, with kaffir corn the original staple and varying subsidiary crops, answering to *Brachystegia-Isobertia* woodlands on the Southern Plateau soils.

(8) *The Upper Valley Thorn System* of the Masukulumbe section of the Ila-Tonga group with maize and kaffir corn chief

crops, similar to the last but distinct in practice through the selection of *Acacia* belts for long-period maize cultivation.

(9) *The Lower Valley Thorn System* of the valley Tonga with kaffir corn and bullrush millet chief crops, following the *Acacia* belts of riverside alluvium in the lower valley *Copaifera-Commiphora* bush.

The relationship of the agricultural system to the vegetation-soil unit may be further illustrated by the fact that in the case of tribes who have migrated in comparatively recent time either the method is changing under the influence of a fresh environment and the contact of tribes proper to that region, or in some cases, the actual migration is being controlled by the soil requirements of the staple crops and by a whole set of associations, real and imaginary, which the forest type holds for the tribe that has lived in it. To illustrate these points in order, the southern Kaonde have pushed down to the southern limit of *Isobertinia paniculata* on hard soils suitable for kaffir corn and now associate themselves with this tree, saying that they will not go into the country where *Cryptosepalum* enters and deep sands are unsuitable for kaffir corn cultivation. On the other hand the Nkoya, whom they are believed to have driven into the sands, are, it would seem, changing from a kaffir corn to a cassava system. A similar change has certainly taken place among the Lunda as they have worked down south into the *Cryptosepalum* zone. By contrast with these cases, the voluntary immigration now in progress of the advanced Luchaze tribe from Angola is following the densest *Cryptosepalum* forest of the type to which they were accustomed on the upper Lungwebungu, without change of agricultural method.

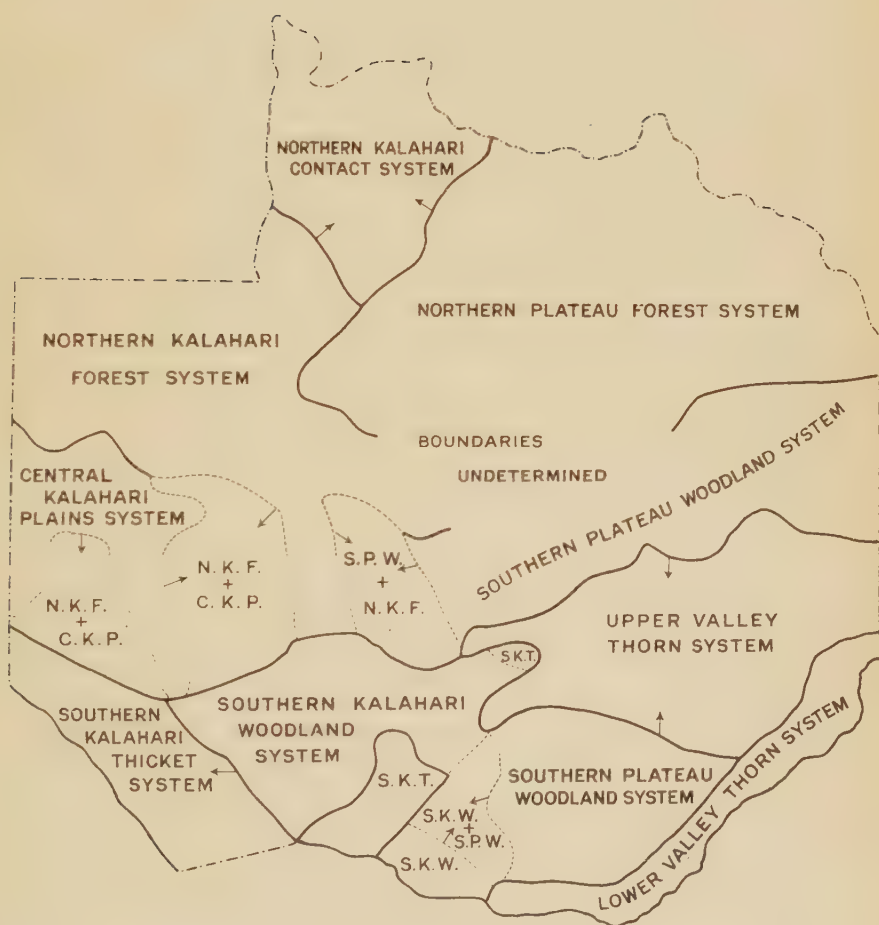
#### PROGRESS IN NATIVE AGRICULTURE.

The parallel study of vegetation-soil units and of native agricultural systems allows of a comparative treatment of these systems from which their degree of development may be estimated, and means found for their improvement upon native lines. This requires some explanation. Progress in native agriculture, where it takes place naturally, is an important point unlike the progress of European communities. Normally it attempts no defeat of environment by the increasing use of fertiliser and other extraneous aids. Adhering to its primitive implements it follows the less ambitious but effective course of an increasingly thorough use of environment. Differences in development of this type are to be found between and within the systems previously quoted. These differences are best summarised as given in the report of the Survey for 1934 "Certain tribes or sections of tribes fall short of the rest in the degree of development of their system. They may lack either the precision of land selection, the variety of gardens and crops or the efficiency of cultural methods of their more advanced neighbours. Commonly their apparently backward methods are the outcome of limitations imposed on them



# NATIVE AGRICULTURAL SYSTEMS.

OVERLAPPING SYSTEMS SHEWN BY ARROWS.







by their environment, and cannot for that reason be improved. But they may equally be conditioned by an inferior mentality and lack of initiative, a low standard of living, lack of contact with other tribes or conservative adherence to an outworn tradition."

Improvement is taking place naturally where, as in Barotseland, an advanced tribe has suzerainty and, at the same time, a great intermingling of tribes has taken place. Marose chiefs have encouraged the spread of the Luyi system, and there has been an exchange of methods and crops and a levelling up of the standard of living. In other cases measures for the accomplishment of this have been suggested by the Survey in the report for 1934 referred to previously.

The possibilities of progress of this type, namely upon native lines, are best investigated upon the basis of comparative ecological survey, because it allows of the adoption for trial of the practices of neighbouring peoples and thus involves the minimum of agricultural experiment. A similar if less obvious application of ecological methods is possible in cases where native agriculture has been adversely affected by contact with Europeans. These changes tend to be retrogressive rather than progressive. The native's knowledge of his environment is forgotten, his traditional system forsaken for a parody of European methods and large scale shifting cultivation of crops for the market leads to land shortage, deforestation and erosion. This state of affairs in reserves adjoining the railway line is alluded to in the report of the Survey for 1933. The processes of change are best worked out by an ecological-agricultural survey, for departure from traditional methods of land selection as well as of agricultural practice are involved. There is, for example, a general tendency to move from Southern Plateau and Transitional sites into thorn belts, particularly of the *Acacia Woodii* type which provides the best European farming land, the object being to secure large areas of easily stumped fertile land. Both these stages and the corresponding stages in departure from the traditional agricultural system have to be recognised before the process can be understood, and remedial measures may have to combine European practices for maintaining fertility with a modified form of the native's tradition.

So long as traditional native practice is involved, an ecological basis is necessary for agricultural development in native areas, for the traditional practice can only be understood through its relationship to environment. This aspect has been deliberately stressed in place of the obvious application of ecological study to question of crop introduction, forest conservation or the prevention of erosion. The general principle underlying this aspect may be stated in conclusion. In Northern Rhodesia, if not in other East African territories, the soil is the factor of primary importance in determining vegetation types, these in turn guide the native's land selection and upon his land selection is based the form of his agricultural tradition. For the understanding of that tradition

the accomplishment of progress in it or the remedying of departure from it it is necessary to look at the soil, and to look at it in the manner of the native, namely through the indications given by the vegetation.

## II—NATIVE MEDICINAL AND POISONOUS PLANTS OF EAST AFRICA. P. R. O. BALLY (Basel, Switzerland).

We are privileged to publish in the following paper the results of Mr. Bally's recent researches into the native uses of East African plants. The majority of the specimens and the information relating to them were collected personally by the author in Tanganyika Territory, but he has also included a certain number (i.e., some remedies used by the Waha, the Wa-Ikizu, and by the Wa-Jaluo) which were kindly supplied to him by the East African Agricultural Research Station, Amani, and the Laboratory Services at Dar-es-Salaam. Some of the determinations were checked at the Kew Herbarium.

In view of the large number of species concerned, the information given in the present paper is confined to botanical and tribal names, uses, and parts employed, omitting all information regarding mode of use, dosage, published literature, and pharmacology.

With regard to tribal names, Mr. Bally wishes to point out that he found these often misleading, the witch doctors of most tribes having their own nomenclature for medicinal plants in order to protect their professional secrets.

The classification followed is that of Hutchinson, "Families of Flowering Plants."

The arrangement of the matter is as follows:—(1) Latin name; (ii) tribal name or names, with names of tribes in brackets; (iii) medicinal uses, with part of plant employed in brackets.

### FILICES

#### CYATHEACEAE

*Cyathea usambarensis* Hiern. Loonge (Chagga). Tapeworm (core and young leaves).

#### POLYPODIACEAE

*Pteris dentata* Forsk. Kichameri (Chagga). Ankylostomiasis (core and root).

### DICOTYLEDONES

#### ANNONACEAE

*Annona chrysophylla* Bojer. Mtopetope, Mfira, Mkonora (Nyamwesi). Antidote for snakebite (leaves); criminal use for poisoning (root).

*Popowia fornicata* Baill. Mkalia (Nyamwesi). Antidote for snakebite (powdered leaves).

*Popowia* sp. Msogu (Nyamwesi). Ankylostomiasis (root).

*Uvaria leptoclados* Oliv. Mshofu (Shambaa); Esa (Suaheli); Mguene, Msarasi (Nyamwesi). Epileptic fits, sunstroke, tonsilitis (root).



*Xylophia Antunesii* Engl. et Diels. Mshenene (Nyamwesi). Cure for barrenness (root).

#### MONIMIACEAE

*Xymalos monospora* Baill. Mkaliakusimu (Nyamwesi). Antidote for snakebite (bark of root).

#### LAURACEAE

*Cassytha filiformis* L. Mlangamia (Nyamwesi). Antidote for snakebite (whole plant).

*Ocotea usambarensis* Engl. Mkulo, Nkuro (Shambaa). Abdominal pains (bark).

#### RANUNCULACEAE

*Clematis inciso-dentata* A. Rich. Magasa (Chagga). Headache (leaves and root).

*Ranunculus pinnatus* Poir. Mtango va Vwasi (Pare). Treatment of wounds (juice).

#### MENISPERMACEAE

*Cissampelos Pareira* L. Mlagalaga, Ukuluantu (Nyamwesi); Kigonde (Kishambaa); Ol egisikon (Masai). Head- and rheumatic-pains, sexual stimulant, abdominal pains (root).

*Jateorhiza palmata* (Lam.) Miers. Kaomwa (Lindi) (Konde); Columbaroot. Dysentery, tonic (root).

*Stephania abyssinica* Dill. et A. Rich. ex Walp. Mkwamabewa (Chagga). Mild purge for children (leaves).

*Trichlisia Saccleuxii* (Pierre) Diels. Lusisi (Sukuma); Lusisi, Jusisi, Msisi, Mzizi (Shambaa). Intestinal worms, venereal disease (root).

#### ARISTOLOCHACEAE

*Aristolochia densivenia* Engl. Lunkulwe (Shambaa, Seguha, Sukuma); Tamba ya Nyoka (Suaheli). Antidote for snakebite and for arrow-poisoning, cough cure, sexual stimulant (root).

#### HYDNORACEAE

*Hydnora africana* Thunb. Nyambo (Suaheli); E'ruguni (Masai). Throat complaints, quinces (astringent) (root).

#### PIPERACEAE

*Piper capense* L.f. Mdeca (Pare). Sexual stimulant, anthelmintic (root).

#### CAPPARIDACEAE

*Boscia coriacea* Pax. Names and uses unknown (bark).

*B. salicifolia* Oliv. Mumjenje (Pare). Febrifuge for cattle (leaves).

*Cadaba adenotricha* Gilg et Bened. Mtindi, Kibabu (Sukuma). Toxic (fruit).

*Capparis persicifolia* A. Rich. Mkorapfumu (Chagga). Cough cure (root).

*Gynandropsis gynandra* Briq. Gagani (Nyamwesi); Muangi (Sukuma). Facilitates birth, internal disorders (root).

#### POLYGALACEAE

*Securidaca longipedunculata* Fresen. Nteyo (Nyamwesi); Mbaso, Nengonengo (Sukuma). Syphilis (root); stomachic (root-bark); antidote for snakebite, purge (leaves).

#### CRASSULACEAE

*Kalanchoë glaberrima* Volkens. Name unknown. Contusions (leaves).

*Kalanchoë* sp. Imbogo (Chagga). Galactagogue for cattle (leaves).

#### CARYOPHYLLACEAE

*Drymaria cordata* Willd. Ukiko, Maramakura (Chagga). Head-ache (leaves).

#### MOLLUGINACEAE

*Gisekia pharnaceoides* L. Mulandega (Syaheli). Diarrhoea (whole plant).

#### PORTULACACEAE

*Portulaca quadrifida* L. Lingoe (Nyamwesi). Prevention of miscarriage (whole plant).

#### POLYGONACEAE

*Oxygonum atriplicifolium* Mart. var. *sinuatum* Bak. Mbivinu (Chagga). Cough cure (leaf-juice).

*Rumex abyssinicus* Jacq. Iweriweri (Chagga); En gaisedjoi Kitok (Massi). Cough cure (leaf-juice).

*R. maderensis* Lowe. Irearemu (Chagga). Eye drops (leaf-juice).

*R. nepalensis* Spreng. Kiweriweri (Chagga). After-throes, treatment of abscess (root).

#### PHYTOLACCACEAE

*Phytolacca dodecandra* L'Herit. Ibesa, Ingorosoi (Chagga); Hoko (Sukuma). Styptic and healing, disinfectant of wounds, internal poison excitant (juice).

#### CHENOPODIACEAE

*Chenopodium Botrys* L. Kwima. Poison (seeds).

*C. opulifolium* Schrad. subsp. *ugandae* Aellen. Omari (Jalua). Eye ointment (leaves).

#### AMARANTHACEAE

*Achyranthes aspera* L. Pululue (Nyamwesi); Prue (Shambaa); Mdala Sukuma; Ol erbat (Masai). Stitch (root); abscess, boils (leaves).

*Celosia trigyna* L. Saza (Shambala); Igiri (Bukoba). Anthelmintic (shoots).

#### OXALIDACEAE

*Oxalis corniculata* L. Manjenju (Chagga); Kidadeishi (Sukuma). Cough cure (leaves).

#### BALSAMINACEAE

*Impatiens Walleriana* Hook. f. Sunguala (Chagga); Tulanange (Sukuma). Liver pains (stems); Abortive (root).

#### PUNICACEAE

*Punica Granatum* L. Ngukumaanga (Chagga); Mkomamanga (Suaheli). Anthelmintic (tapeworm) (root).

#### ICACINACEAE

*Apodytes dimidiata* E. Mey. Lemo, Luachogo (Jaluo). Inflammation of the ear (leaf).

#### THYMELAEACEAE

*Lasiosiphon Watkei* Engl. Mwata (Pare); Mtelele (Nyamwesi). Purge and poisonous (root).

#### PASSIFLORACEAE

*Adenia globosa* Engl. Mpora (Suaheli). Cattle medicine for purpose unknown (trunk).

*A. gummifera* Harms. Mandali (Suaheli); Ngole (Sukuma). Antidote for arrow poisoning (root).

#### CUCURBITACEAE

*Cucumis myriocarpus* Naud. Ngawaya (Gogo). Uses unknown.

*Momordica foetida* Schum. Iuru (Chagga). Ear-ache (leaf).

*M. Schimperiana* Steud. Iuru (Chagga). Ear-ache (leaf); insecticide (fruit).

*M. umbellata* (Cogn.) Harms. Ol amboshi (Masai). Diaphoretic (juice of root).

*Raphanistrocarpus* sp. Kkaje (Taita). Part of cure for bubonic plague (root).

*Telfairia pedata* Hook. Makungú (Chagga); Queme (Shambaa). Tonic after childbirth (seed).

#### OCHNACEAE

*Brackenridgea zanguebarica* Oliv. Mōka, Kiogokueka (Nyamwesi). Treatment of wounds, antidote for snakebite (bark).

#### MYRTACEAE

*Syzygium guineense* DC. Mzarabo (Rifiji); Msambaran (Suaheli). Dysentery (fruit).

#### MELASTOMATACEAE

*Dissotis rotundifolia* Tr. Kiendecheká (Shambaa). Anthelmintic (leaves).

#### COMBRETACEAE

*Combretum Greenwayi* Exell. Mulavasi (Nyamwesi). Chest complaints (leaves).

*C. Gueinzii* Sond. subsp. *splendens* Exell. Mulama, Mlama (Nyamwesi); Mnama (Sukuma). Antidote for snakebite (root, leaves); abortion, constipation (root).

*Combretum* sp. Musana, Msana (Nyamwesi). Scorpion-bite (leaves).

*Combretum* sp. Melekera (Nyamwesi). Leprosy (root).

#### HYPERICACEAE

*Hypericum peplidifolium* A. Rich. Sungudli (Chagga). Indigestion (leaves).



*Psorospermum febrifugum* Spach. M kuvagwe (Kiha); Ekchereka (Ikizu). Rashes, eruptions, treatment of wounds (root).

#### TILIACEAE

*Corchorus olitorius* L. Kala (Suaheli). Tonic (twigs, leaves).

*Grewia bicolor* Juss. Mkole (Gogo); Mkomakoma (Kiha); Os siteti (Masai). Chest complaints (root).

*G. Forbesii* Harv. Msokote (Nyamwesi); Mchagi (Sukuma). Lumbago, stiff-neck (root).

*G. plagiophylla* K. Sch. Mdomoka (Taita). Part of remedy for bubonic plague (root).

#### STERCULIACEAE

*Dombeya rotundifolia* Harv. Mluati (Seghua). Abdominal pains (root).

*Sterculia appendiculata* K. Sch. Mfuni (Shambaa). Abdominal pains (purge) (leaf-stalks).

#### MALVACEAE

*Abutilon indicum* L. Fiéwie (Shambaa). Inflammation of eye (root).

*Hibiscus fuscus* Garcke. Msindati (Pare). Sexual stimulant (root).

*H. micranthus* L. Msase, Muambe (Suaheli); Mburi (Sukuma); Ol egogoia (Masai). Kidney-trouble, antidote for snakebite (leaf-juice).

#### EUPHORBIACEAE

*Acalypha fruticosa* Forsk. Sissi, Izi (Taita); Os siaiti ado (Masai); Mfulwe (Pare, Sukuma). Inflammation of the eye (leaf-juice); gonorrhoea, antidote for snakebite, febrifuge (root).

*Acalypha* sp. Mufiajianjia (Suaheli). Swellings? (Leaves).

*Antidesma venosum* E. Mey. Msuaga (Suaheli). Abdominal pains (leaves, fruits, twigs).

*Bridelia micrantha* Baill. Muesa (Seguha). Headache (root).

*B. scleroneuroides* Pax. Mulyanyoni (Kiha). Stomach-ache (root).

*Croton macrostachys* Hochst. ex A. Rich. Ifurufuru (Chagga). Anthelmintic (leaf-juice)

*C. megalocarpus* Hutch. Ol Marbait, Ol Mergoit (Masai); Lali (Chagga). Anthelmintic, tonic (bark).

*C. pseudopulchellus* Pax. Mgagana, Mgeigel, Mkuambe (Nyamwesi). Asthma (root); syphilitic ulcer (leaves).

*Erythrococca rigidifolia* Pax. Kimbumbu (Chagga). Cough cure (leaf-juice).

*Euphorbia hirta* L. Mziwaziwa (Suaheli); Kiawaame (Sukuma). Gonorrhoea, diuretic, anthelmintic? (whole plant).

*E. Schimperiana* Scheele. Molotava (Chagga). Purge (root, leaves).

*E. Tirucalli* L. Utupa, Mwasi, Malangali (Suaheli); Manyara (Dodoma); Ol aile (Masai). Fish poison (latex); said to keep away mosquitoes (tree).

*Euphorbia* sp. Lumbi (Taita). Purge, anthelmintic (whole plant).

*Fluggea virosa* Baill. Mkwambwa (Shambaa). Malaria (root).

- Mildbraedia fallax* Hutch. Mtapatapa mkufua. Chest complaints (root).
- Oldfieldia* sp. Mpumbombega (Suaheli). Poison (bark, exhalation).
- Phyllanthus discoides* Müll. Arg. Lusenga (Suaheli). Ulcers caused by "jigger" burrowing flea (leaves).
- P. leucanthus* Pax. Kimamruka (Chagga). Activates cicatrization of umbilical cord (juice from root).
- Phyllanthus* sp. Munyamachi (Taita). Part of remedy for bubonic plague (root).
- Phyllanthus* sp. Kilumbo (Seghua). Gonorrhoea (root).
- "    "    Mriombeke (Chagga). Ulcers, abscess (leaves, fruits).
- Pseudolachnostylis maprouneifolia* Pax. Mutoto (Kiha). Purge (root).
- Ricinus communis* L. Igonu (Chagga). Abdominal pains, diarrhoea (root); carbuncles, treatment of wounds (leaves).
- Sapium ellipticum* Pax. Msharaka (Chambaa). Maggoty wounds (branch).
- S. madagascariense* Prain. Usungu (Taita, Gariama); Musungu (Shambaa). Ingredient for arrow poison (leaves).
- Synadenium* sp. Mvunja Kongwa (Suaheli). Fish poison (latex).
- S. Volkensii* Pax. Maasa (Chagga). Styptic, internal poison (latex); Malaria (root).

#### ROSACEAE

- Hagenia abyssinica* Willd. Mwanga, Malaagi (Chagga). Anthelmintic (flowers).

#### CHAILLETIACEAE

- Dichapetalum* sp. Ludi (Taita); Duaiu (Sukuma). Poison (leaves, root).
- D. Stuhlmanni* Engl. Nchenchere (Lindi); Nyenya. Poison (leaves).

#### CAESALPINIACEAE

- Bauhinia Thonningii* Schum. Mubamba ngoma (Suaheli); Os sagararam (Masai); Mshindambogo (Nyamwesi); Mtindamboga (Kiha); Mgonambogo Msegesse (Shambaa). Gonorrhoea, ankylostomiasis, cough-cure, chest complaints (root).
- Cassia alata* L. Muambangoma (Shambaa). Wash newly-born children (leaves).
- C. angolensis* Welw. ex Hiern. Undaunda (Bondei); Mkungwena (Shambaa). Gonorrhoea, cough-cure (leaves).
- C. abbreviata* Oliv.? Names and parts used unknown. Blackwater.
- C. didymobotrya* Fresen. Ivinu (Chagga); e Senetoi (Masai). Powerful purge (root); mild purge, fish poison (leaves).
- C. fistula* L. Mkusingue, Muhumba (Bagamoyo). Blackwater (parts used unknown).
- C. singueana* Del. Mhumba (Suluma); Msindati (Pare). Toxic (fruit); syphilis (root).

*C. Tora* L. Names, uses and parts used unknown.

*Delonix elata* Gamble. Mvutambula (Nyamwesi); Ol donoroioroi (Masai). Antidote for snakebite (leaves).

*Pterolobium exosum* Bak. f. Mragangungu (Chagga). Febrifuge (leaves); toothache (root).

#### MIMOSACEAE

*Acacia arabica* Willd. Ol Giloriti (Masai); Ol Mumunj. Excitant (bark).

*A. Nefasia* Schweinf. Ol debessi (Masai). Gonorrhoea (bark).

*A. Seyal* Del. var. *fistula* Oliv. Ol jerai (Masai). Excitant (bark).

*A. usambarensis* Taub. Mtugo (Taita). Part of remedy for bubonic plague, malaria (root).

*Acacia* sp. Kikwessa (Seguha). Sexual stimulant (root).

*Albizzia anthelmintica* Brongn. Ol mokotan (Masai); Mfureta (Chambaa); Mkuta (Chagga); Mpingu (Sukuma). Anthelmintic (root); Sexual stimulant, gonorrhoea, haemorrhage after birth (bark).

*A. brachycalyx* Oliv. Mlangalanga (Kiha). Rheumatic pains (bark).

*A. maranguense* Taub. Mfurangshe, Mruka (Chagga). Cough-cure (bark).

*A. versicolor* Welw. Mduruasi (Suaheli); Mukingu (Seguha); Mkingu (Sukuma). Headache (bark of root); arrow poison?

*Dichrostachys glomerata* Chiov. Mkulajembe (Suaheli); Mwingano (Chagga); Mtundulu (Nyamwesi); Mkeragembe (Seguha). Antidote for snakebite (leaves); chest complaints, gonorrhoea (root); syphilis.

*Entada abyssinica* Steud. Mfufuma simba (Seguha). Rheumatic pains (root-bark).

*E. phaseoloides* (Linn.) Merr. Godogo (Sukuma). Fruit toxic.

*E. Stuhlmanni* Harms? Munyama (Nyamwesi). Galactagogue (internal and external use) (root).

*Erythrophloeum guineense* Don. Muhai (Songea); Mkola (Nyamwesi); Muafi (Suaheli). Ordeal, anthelmintic (bark); antidote for snakebite (leaves).

*Mimosa asperata* L. Mgeigei (Kiha). "Mbengu" (swelling of limbs without external wounds) (infection) (leaves).

#### PAPILIONACEAE

*Abrus precatorius* L. Mtipitipi, Mongaluchi (Suaheli); Kachenche (Nyamwesi); Lufiambo (Sukuma). Antidote for snakebite, syphilis (leaves).

*Alysicarpus glumaceus* DC. Mpakapaka (Suaheli); Silubua (Pare). Veldt sores, thrush (leaves and stalks).

*Cajanus Cajan* Millsp. Mbalasho (Chagga); Mbaasi (Suaheli). Diarrhoea (leaves); toothache (root).

*Crotalaria axillaris* Ait. Mposhokwe (Pare). Promotes menses (root).



- C. retusa* L. Mchekeche (Suaheli). Fish poison? (leaves); toxic for fowls? (seeds).
- C. Thomsoni* Oliv. Mteiu (Suaheli). Abdominal pains (leaves).
- C. Zimmermannii* Bak. f. Ol Airashavash (Masai). Toxic for cattle (leaves).
- Dalbergia melanoxydon* Guill. & Perr. Mhingo (Seguha); Mpingo (Suaheli). Abdominal pains (root).
- Desmodium scalpe* DC. Kipuchamdo (Chagga). Abdominal pains (leaves).
- Dolichos pseudopachyrrhizus* Harms. Mhayo (Sukuma). Insecticide (root).
- Erythrina tomentosa* R. Br. ex A. Rich. Ol oboni (Masai); Mriri (Chagga); Mungu (Sukuma). Gonorrhoea, malaria (bark); Toxic (fruit).
- Erythrina* sp. Mkalalohobwe (Nyamwesi). Dropsy (root).
- Indigofera arrecta* Hochst. Wnaganaga, Mhanahana (Chagga). Abdominal pains (root).
- Lonchocarpus Bussei* Harms. Mbale (Nyamwesi, Sukuma); Ol bararuai (Masai). Galactogue, gonorrhoea (root).
- L. eriocalyx* Harms. Muvare (Kiha). Eruptions on skin (root).
- Millettia oblata* Dunn. Mhafa (Sukuma). Bladder troubles (root).
- Mundulea sericea* A. Chev. Utupa ya porini, Mkwaja (Suaheli). Fish poison (bark).
- Ostryoderris Stuhlmanni* Dunn ex Bak. f. Mumundu (Suaheli). Chest complaints (leaves).
- Phaseolus Mungo* L. Chooko, Chirroko (Suaheli). Leprosy, abscess, tumors (seed).
- Pterocarpus Bussei* Harms. Mhagata (Seguha); Miniga (Syamwesi). Abortive (juice of bark).
- Sophora tomentosa* L. Names unknown. Fish poison (part used unknown).
- Tephrosia Vogelii* Hook. f. Utapa (Suaheli). Fish poison, abortion (leaves).
- Vigna unguiculata* Walp. Kunde (Suaheli). Toxic antidote for snakebite (root).

#### MYROTHAMNACEAE

- Myrothamnus flabellifolia* Welw. Chanassa (Songea). Chest complaints, tonic (leaves).

#### MYRICACEAE

- Myrica kilimandscharica* Engl. Mpache (Chagga); Ol getalasua (Masai). Abdominal pains, indigestion (root).
- M. Meyeri-Johannis* Engl. Mpache (Chagga). Abdominal pains, indigestion (root).

#### ULMACEAE

- Trema guineensis* Ficalho. Mgendagenda (Suaheli); Mwesi (Chagga). Pleurisy (leaf, fruit); toxic for goats (leaf).

#### MORACEAE

- Cardiogyne africana* Bureau. Mnembua (Nyamwesi). Lumbago (latex).

- Ficus capensis* Thunb. Mkuu (Chagga). Galactagogue (external bark).  
*F. natalensis* Hochst. Munangara (Ikizu). Antidote for snakebite (root).  
*F. Sycomorus* L. Ol nanboli (Masai). Diarrhoea (bark).  
*F. Vogelii* Miq. Mtemboe (Chagga). Styptic and healing (latex).

#### URTICACEAE

- Fleurya lanceolata* Engl. Chuata (Shambaa). Toothache (juice).  
*Obetia pinnatifida* Baker. Chuata (Shambaa) ; Puputishe (Sukuma).  
 Toothache, protection against rats (leaves).

#### RHAMNACEAE

- Rhamnus prinoides* L'Herit. Mshimbanumba (Chagga) ; Ol gonjel (Masai). Colics (root).  
*Rhamnus* sp. Ol kokola (Masai). Gonorrhoea (root).

#### CELASTRACEAE

- Catha edulis* Forsk. Mandama (Shambaa) ; Mira (Kikuyu).  
 Intoxicant, tonic (leaves).  
*Elaeodendron* sp. Mgakama (Nyamwesi). Ulcerations, carbuncles (root).  
*Gymnosporia putterlickioides* Loes. Mkuanga (Shambaa). Rescinds retching (root).  
*Gymnosporia* sp. Mweza. Diarrhoea, febrifuge (root).  
*Gymnosporia* sp. Mibwasungu (Nyamwesi). Antidote for snakebite (bark).

#### SALVADORACEAE

- Azima tetracantha* Lam. Mwelewele (Nyamwesi) ; Ndewe (Suaheli).  
 Antidote for snakebite (root and leaves).  
*Salvadora persica* Garcin. Msuake (Suaheli) ; O-remit (Masai).  
 Ankylostomiasis, mustard plaster, gonorrhoea, bladder troubles and pains of spleen (root).

#### OLACACEAE

- Ximenia americana* L. Mtundua (Nyamwesi) ; Mpingi (Sukuma) ;  
 Lama (Chagga) ; Ol ama (Masai). Febrifuge, diarrhoea (root).

#### SANTALACEAE

- Osyris tenuifolia* Engl. Ol asasiai (Masai) ; Liwa, Nzulu (Shambaa).  
 Gonorrhoea, rheumatic pains, galactagogue, tonic (root).

#### AMPELIDACEAE

- Cissus adenocaulis* Steud. Mwengele (Suaheli) ; Muengere (Sukuma).  
 Remedy for "dulasi" [an infectious disease amongst the coast natives], abscess, carbuncles, prevents abortion (root).  
*C. Hildebrandtii* Gilg. Msango (Shambaa). Antidote for snakebite and for arrow-poisoning (juice).  
*C. Oliveri* Gilg. Mkaanchu (Chagga) ; Nyotambidi (Suaheli) ;  
 Ol eramtam (Masai). Remedy for "dulasi" (root) ;  
 constipation (leaves).

*C. quadrangularis* L. Os sugurtuti, Ol dinai (Masai) ; Kihindihindi (Sukuma) ; Numa (Kerewe) ; O'rarait (Masai). Ulcerations, treatment of wounds (leaves) ; myalgic pains (root) ; earache (juice).

*Rhoicissus erythroides* Planch. Ol egilena, Ol gilenyai (Masai). Excitant, gonorrhoea (root) ; treatment of wounds (juice).

#### RUTACEAE

*Fagara amaniensis* Engl. Mfuakumbi (Shambaa). Toothache (bark).

*F. olitoria* Engl. Mnugunungu (Nyamwesi) ; Genjeka (Taita). Facilitates delivery, part of remedy for bubonic plague (leaves).

*Teclea amaniensis* Engl. Miense (Suaheli). Headache (bark).

*T. nobilis* Delile. Mdimu (Nyamwesi). Gonorrhoea (bark).

*T. simplicifolia* Verdoorn. Ol gelai (Masai). Gonorrhoea, tonic (root) ; pneumonia (leaves).

*Toddalia asiatica* Lam. Oleragudj, Olaiseramai (Masai) ; Mkananga (Chagga) ; Mdongo nyesi (Sukuma). Cough-cure (fruits) ; indigestion, influenza (root).

*T. sansibarensis* Engl. Msjepasjepa (Suaheli). Antidote for snakebite (root-bark).

#### SIMARUBACEAE

*Balanites aegyptiaca* Delile. Muambangoma (Nyamwesi) ; Mkonga (Morogoro). Fish poison (fruit, bark).

*B. glabra* Mildbr. & Schltr. Name unknown (Seguha). Internal poison (bark).

*Brucea antidysenterica* J. F. Miller. Mrikanwandu (Chagga). Abdominal pains (leaves, root).

*Harrisonia abyssinica* Oliv. Ol dungui, en gulelo (Masae) ; Msoma, Mgowole (Suaheli) ; Mkussu (Sukuma) ; Pedro (Jaluo) ; Chungue (Taita). Ankylostomiasis, anthelmintic, part of the remedy for bubonic plague (root) ; piles, antidote for snakebite (leaves).

#### BURSERACEAE

*Boswellia Carteri* Bird. Ubani (Suaheli). Diuretic (resin).

*Boswellia* sp. Muhodja (Nyamwesi). Gonorrhoea (root).

*Commiphora Boiviniana* Engl. Mburusigi (Seguha). Dysentery (bark).

*C. pilosa* Engl. Mponda (Nyamwesi). Antidote for snakebite (leaf and root).

*C. Zimmermannii* Engl. Mfifina (Chagga). Toothache (leaf-stalks) ; indigestion (bark).

*Commiphora* sp. Mumuongo, Muongo (Nyamwesi). Antidote for snakebite (bark).

*Commiphora* sp. Angiani (Masai). Disinfectant for wounds (resin).

#### MELIACEAE

*Turraea* sp. Nyakururu (Ikizu). Abdominal pains (root).



## SAPINDACEAE

- Allophyllus alnifolius* Radlk. Bangue (Nyamwesi). "Dulasi" (root).  
*Deinbollia* sp. Mkarye (Kiha). Chest complaints (root).  
*Pappea ugandensis* Bak. f. Ol dimigomi (Masai); Mubamba ngoma (Suaheli). Tonic, sexual stimulant, chest complaints (bark).  
*Zanha golungensis* Hiern. Mkália (Nyamwesi). Chest complaints (bark).

## MELIANTHACEAE

- Bersama paullinioides* Baker. Mrandangube (Chagga); Mrindawa. Aperient, anthelmintic (bark).

## ANACARDIACEAE

- Heeria mucronata* Bernh. Mkalakala, Mwelewele (Nyamwesi). Dysentery (root); antidote for snakebite (juice of leaves).  
*H. reticulata* (Bak. f.) Engl. Muhva (Kiha); Mwalika, Zabibu ya mwitu (Suaheli); Mkalakala (Seguha); Mkala (Sukuma); Nambono (Tunduru). Galactogogue, sexual stimulant (root); pink-eye (bark).  
*Lannea edulis* (Sond.) Engl. Tribal names unknown. Dysentery (root).  
*L. Kirkii* Burt-Davy. Mtundu (Suaheli). Antidote for snakebite (root).  
*L. Stuhlmanni* (Engl.) Engl. Mnyumbu (Nyamwesi). Abscess, carbuncle (leaves).  
*Rhus natalensis* Bernh. Msagara (Kiha); Ol mesigie (Masai); Mhunguru (Sukuma). Gonorrhoea, influenza, treatment of wounds (root).

## ARALIACEAE

- Cussonia arborea* Hochst. Kihondogoro (Kiha); Yagi ya nsovu (Sukuma). Gonorrhoea, vapour bath (root).

## UMBELLIFERAE

- Steganotaenia araliacea* Hochst. Mogura (Seguha); Mogola (Sukuma). Sore throat (root); asthma (bark).

## ERICACEAE

- Agauria salicifolia* Hook. f. Mgagana (Chagga). Toxic for cattle, insecticide, antidote for arrow-poisoning, healing ointment (leaves).

## EBENACEAE

- Euclea frutuosa* Hiern. Os sodjo, Ol ginje (Masai); Mdala (Shambaa, Sukuma); Muenya (Nyamwesi). Ankylostomiasis, Yaws—external (root); splenic swellings (root and bark).

## SAPOTACEAE

- Mimusops* sp. Mtsheidji (Nyamwesi). Chest complaints (root).

## MYRSINACEAE

- Embelia kilimandscharica* Gilg. Gezi (Chagga); Os sumategi (Masai). Anthelmintic (fruit).

- Embelia* sp. Ol jani njugi, Ol chani onyokye (Masai). Anthelmintic (bark).  
*Maesa lanceolata* Forsk. Ol odoa, Ol onorua (Masai). Anthelmintic, aperient (fruit).  
*Rapanea rhododendroides* Mez. Kirjasi (Chagga). Anthelmintic (fruit).  
*R. usambarensis* Gilg. Mshiro (Sukuma). Aperient (root).  
*Rapanea* sp. Karombaria (Kikuyu). Anthelmintic (fruit).

#### LOGANIACEAE

- Strychnos pungens* Solered. Mkole (Suaheli). Antidote for snakebite (part used unknown).  
*S. spinosa* Lam. Mpapa (Suaheli) ; Mubale (Nyamwesi). Antidote for snakebite (part used unknown).  
*S. Volkensii* Gilg. Moage, Muage (Nyamwesi). Antidote for snakebite, dropsy (root).  
*S. Wakefieldii* Baker. Muhonsia (Nyamwesi). Obstetrics (bark).  
*Strychnos* sp. Mkangara (Shambaa). Chest complaints (root).

#### OLEACEAE

- Jasminum mauritianum* Boj. Muafu (Nyamwesi) ; Mandale (Sukuma). Antidote for snakebite (bark of root) ; toxic (root).  
*Linociera Welwitschii* Baker. Ol loliondo (Masai) ; Mshihio (Chagga). Gonorrhoea (bark).

#### APOCYNACEAE

- Acokanthera Friesiorum* Markgraf. Obosongo (Kkizu). Arrow-poison (root).  
*A. longiflora* Stapf. Ol Morijoi (Masai). Arrow-poison (branches).  
*Adenium coetaneum* Stapf. Mayanga (Shambaa). Arrow-poison, fish-poison, internal poison (branches).  
*Carissa edulis* Vahl. Mfudje-anje (Nyamwesi). Chest complaints (root).  
*Conopharyngia Holstii* Stapf. Mkomba (Chagga). Styptic (latex).  
*Diplorhynchus mossambicensis* Benth. Mtogo (Seguha). Mbelembele (Nyamwesi). Facilitates delivery of child, antidote for snakebite (bark of root).  
*Landolphia Petersiana* Dyer. Mtambaanche, Mbohoya (Nyamwesi) ; Mpera ya porini (Suaheli). Antidote for snakebite (twigs and fruit) ; colics (root).  
*L. parvifolia* K. Sch. Mbungobungo (Jaluo). Arrow-poison (parts used unknown).  
*Rauwolfia inebrians* K.Sch. Mesesewe, Msewesewe (Chagga). Styptic (latex) ; intoxicant (bark).  
*Strophanthus Courmontii* Saccl. Bohora (Sukuma). Toxic (seeds).  
*S. Eminii* Aschers. et Pax. Mtolo, Mtowo (Uhehe) ; Mtungululu (Nyamwesi) ; Msungulu (Suaheli) ; Mweriweri (Gogo). Arrow-poison (tubers, root).

#### ASCLEPIADACEAE

- Gymnema sylvestre* R. Brown. Tribal names unknown. Stupefies faculty for tasting sweetness (leaves).

- Sarcostemma viminale* R. Br. Ol dewo (Masai). Thirst-relieving (stem).  
*Schizoglossum shirensense* N.E.Br. Uzara (Nyamwesi). Dysentery, stomachic, sexual stimulant (whole plant).  
*Stapelia Dummeri* N.E.Br. Kaulira (Baganda). Earache (juice).

#### RUBIACEAE

- Borreria compacta* K. Sch. Wazanaki (Ikizu). Mustard-plaster (leaves).  
*Crossopteryx febrifuga* Benth. Msandjwambeke, Msasambeke (Nyamwesi). Syphilitic ulcer (bark of root); inflammation of eye (leaves).  
*Randia vestita* S. Moore. Mochangoka (Nyamwesi); Mdyassa (Seguha). Aperient, indigestion, gonorrhoea (root).  
*Hymenodictyon parvifolium* Oliv. Mimbiti (Shambaa); Mrinditi (Nyamwesi, Pare). Kidney trouble, convulsions (root); inflamed eye (leaves).  
*Mussaenda* sp. Obinju (Jaluo). Myalgic pains (leaves).  
*Mussaenda* sp. Achak, Anyoka (Jaluo). Abdominal pains (leaves and bark).  
*Oldenlandia Bojeri* Hiern. Mkuku pingua (Nyamwesi). Antidote for snakebite (leaves).  
*O. globosa* Hiern. Akazibango (Urundi). Piles (whole plant).  
*O. Johnstoni* Oliv. Singiambewa (Chagga). Diarrhoea (leaf-juice).  
*Pavetta canescens* DC. Munyamyenda (Kiha). Sore throat (bark).  
*Pentanisia uranogyne* S. Moore. Munyapome (Shambaa). Abdominal pains (root).  
*Pentas purpurea* Oliv. Nzimasi (Pare); Ol enjorio, Ol iogiono (Masai). Promotes menses (root); febrifuge, rheumatic pains, headache (juice).  
*Rytigynia Schumannii* var. *Uhligii* Robyns. Kiviroe (Chagga). Pleurisy, rheumatic pains (leaf).  
*Vangueria apiculata* K. Sch. Mgugunwa (Kiha). Anthelmintic (root).  
*V. tomentosa* Hochst. Mtiegu, Viru (Suaheli); *Mvili* (Shambaa); Ndaria (Pare). Smallpox—external (leaves); anthelmintic (root).

#### COMPOSITAE

- Ageratum conyzoides* L. Ipfuna (Chagga); Ol orowil el aijok (Masai). Abdominal pains (root).  
*Artemisia afra* Jacq. Fifi (Sukuma). Cough-cure (whole plant).  
*Aspilia Holstii* O. Hoffm. Mshayasha ngozo (Pare); Njanganjangala (Shambaa). Lumbago, sciatica, neuralgic pains (root).  
*Blepharisperrum zanguibaricum* Oliv. & Hiern. Mlanga (Shambaa). Dropsy (root).  
*Dicoma anomala* Sond Usara. (Tribe unknown). Dysentery (root).  
*Emilia sagittata* DC. Mchekacheke (Suaheli); Puishi (Sukuma). Pink-eye (juice); colics—Babies (root).



- Gynura crepidioides* Benth. Prisi (Shambaa). Stryptic—bleeding from the nose (leaves).
- Helichrysum Hochstetteri* Hook. f. Ikovi, Kichameri (Chagga). Abdominal pains, heartburn (leaves).
- Microglossa oblongifolia* O. Hoffm. Maashu (Shambaa); Ol desa (Masai): Toothache (leaves).
- Senecio Stuhlmannii* Klatt. Mbusunga (Shambaa). Ulcerations (leaves).
- S. subscandens* Hochst. Baranjaamba (Chagga); Mguene (Shambaa); En dule (Masai); Hosa (Seguha); Nyengesa (Sukuma). Abdominal pains, convulsions, fever, toothache, cancer, antidote for ? (leaves).
- Sonchus oleraceus* L. Mshunga (Pare). Anthelmintic (root).
- Spilanthes Acmella* L. Usoro, Isingamanayego (Chagga); Ekum (Masai). Toothache, febrifuge, sore throat (whole plant).
- Vernonia cinerea* Less. Lupia (Suaheli). Stomachic (leaves and flowers).
- V. iodocalyx* O. Hoffm. Mhasha (Shambaa); Mnyatira (Sukuma). Epileptic fits, indigestion, facilitates birth (whole plant).
- V. podocoma* Schultz. Iruru (Chagga; Ndulusya (Konde). Purge for cattle (leaves); styptic, healing fish poison (juice).
- Vernonia* sp. Msimamongo (Tiata). Stomachic (leaves).
- Vernonia* sp. Ol Mobasa (Masai). Gonorrhoea (root).

#### BORAGINACEAE

- Cordia Gharaf* Ehrenb. Ol durgo (Masai). Inflammation of eye—cattle, abortion (root).
- C. ovalis* R. Br. Magomosi (Shambaa). Leprosy (bark).
- C. quarensis* Guerke. Os segi (Masai). Abortion (root).
- Ehretia silvatica* Guerke. Mnemvu, Yambu (Chagga). Styptic, healing (juice).

#### SOLANACEAE

- Capsicum frutescens* L. Kamlar (Jaluo). Bubonic plague—external (leaves).
- Datura fastuosa* L. Tribal names unknown. Intoxicant (seed, root); Poison (leaves).
- Solanum Bojeri* Dun. Amatoborwa (Kerewe). Ulcerations (leaves).
- S. incanum* L. Nduo (Chagga); Mtungújamito, Mtungusa (Nyamwesi); Ntula (Sukuma). Abdominal pains, liver troubles, carbuncle (root); antidote for snakebite (fruit); earache (gallnuts).
- S. nodiflorum* Jacq. Muyanya porini (Suaheli). Abscess, ulcerations, carbuncle (leaves).
- Withania somnifera* Dun. Kuviá (Nyamwesi); Dambarico (Pare); Mgeda (Sukuma); Ol asajet (Masai). Sexual stimulant, abortifacient, pink-eye (root).

#### CONVOLVULACEAE

- Merremia angustifolia* Hall. f. Miguasungu (Nyamwesi). Antidote for snakebite (leaves).

## OROBANCHACEAE

*Cistanche tinctoria* (Forsk.) G. Beck. Gingiadiu (Pare). Abscess, carbuncle, sore throat (root).

## BIGNONIACEAE

*Kigelia aethiopica* Decne. Masina (Taita); Melegea (Bondei); Ol darboi (Masai); Mvungue (Seguha). Intoxicant, sexual excitant, treatment of wounds (fruit).

*Markhamia obtusifolia* Sprague. Mkola (Kiha); Mtarawanda (Sukuma). Convulsions, against barrenness (root).

*Stereospermum Kunthianum* Cham. Munyeresangue (Kiha). Cough-cure (pod).

## PEDALIACEAE

*Sesamum angustifolium* Engl. Mlinga (Mwansa); En delemet (Masai). Burns (juice).

## ACANTHACEAE

*Thunbergia* sp. Kiseranginda (Chagga). To ease afterpains (leaf-juice).

*Asystasia gangetica* T. And. Kichwamangwo (Suaheli). Antidote for snakebite (leaves).

## VERBENACEAE

*Clerodendron Johnstoni* Oliv. Shimbo, Ukandra, Ikwandira (Chagga). Expecto- rant (leaves).

*C. myricoides* Hochst. Ol Mokodat (Masai). East coast fever [cattle] (bark of root).

*Lantana salviifolia* Jacq. Mtululu (Suaheli). Ol marigireni, Os sinoni (Masai). Galactogogue (leaves).

*Vitex amboniensis* Guerke. Mtalali (Suaheli). Antidote for snakebite (whole plant).

*V. chrysoclada* Boj. Majimaji (Suaheli). Ulcerations? (leaves).

## LABIATAE

*Coleus kilimadschari* Guerke. Mfureta (Chagga). Stomachic (leaves).

*Coleus* sp. near *C. kilimandschari*. Barakuva, Batakuva (Suaheli). Abortifient (leaves).

*Fuerstia africana* Th. & C. E. Fries. Kimamúhu, Kimamho (Chagga). Malaria, aperient, anthelmintic ankylostomiasis (whole plant).

*Coleus* sp. Kitolo (Chagga). Treatment of wounds (juice).

*Hoslundia opposita* Vahl. Munjinua, Mswele (Nyamwesi), Mkalula, Mshelele (Sukuma). Abdominal pains (root); swellings ["dulasi"], antidote for snakebite (leaves).

*H. verticillata* Vahl. Tribal names unknown. Febrifuge (root, leaves).

*Hyptis pectinata* Poit. Osandogue, Hoza ndogoi (Shambaa). Congestion of respiratory organs, stomachic (leaves).

*Leonotis mollissima* Guerke. Irengue (Chagga); Muhasi (Sukuma). Treatment of veldt sores (root); antidote for snakebite (leaves).

- Micromeria abyssinica* Benth. Kimamsico, Kibeje (Chagga).  
Bronchitis, febrifuge (leaves).  
*Moschosma multiflorum* Benth. Gombo (Chagga); Ol magingi  
(Masai). Cough-cure (root, leaves); flatulence (root).  
*Ocimum americanum* L. Pupu (Chagga); Kinuka (Suaheli);  
Msumbampungu (Sukuma). Bilharziosis, antidote for snake-  
bite (leaves).  
*Plectranthus elegans* Britten. Domondo (Shambaa). Sore throat  
(leaves).

## MONOCOTYLEDONES

### COMMELINACEAE

- Commelina benghalensis* L. Ikengera (Suaheli); Kafura (Sukuma).  
Thrush (juice from calyx).

### FLAGELLARIACEAE

- Flagellaria guineënsis* Schum. Mtiba (Suaheli); Kilonga masi,  
Kisulumuto (Seguo). Skin-diseases and veldt sores (whole  
plant).

### ZINGIBERACEAE

- Costus* sp. Tungu (Bondei). Anthelmintic (stalks).

### LILIACEAE

- Aloë* sp. Losa (Shambaa); Losa (Sukuma). Ulcerations (juice).  
*A. Volkensii* Engl. Mradune (Chagga); Os suguroi (Masai).  
Burns (juice).  
*Asparagus africanus* Lam. Lwafumbo (Taita); Em bere e baba  
(Masai). Part of remedy for bubonic plague (root).  
*A. falcatus* L. Mulabange, Mwinikanguru (Suaheli); Mungui  
(Sukuma). Syphilitic ulcer [external] (root and leaves);  
anthelmintic? (leaves).  
*Asparagus* sp. near *A. racemosus* Willd. Schumbue (Pare). Bilhar-  
ziosis (root).

### ARACEAE

- Gonatopus Boivinii* Hook. f. Kussuguru (Shambaa); Shuguru  
(Sukuma). Dropsy (root).  
*Zamioculcas Loddigesii* Schott. Ngulukesi (Sukuma). Ulcerations  
(root).

### DIOSCOREACEAE

- Dioscorea bulbifera* L. Ndu (Chagga); Ndiga (Sukuma). Pink-eye  
(leaves).

### AMARYLLIDACEAE

- Crinum Kirkii* Baker. Kititi (Sukuma). Aperient, toxic (root).

### AGAVACEAE

- Dracaena fragrans* (L.) Saccl. Rumbasale (Chagga). Abdominal  
pains, to ease after-pains (root).  
*D. Steudneri* var. *kilimandscharica* N. E. Br. Masale (Chagga);  
Masai (Taita). Flatulence (leaves).  
*Sansevieria Kirkii* Baker. Mkonge (Nyamwesi). Foot sores (root).



## GRAMINEAE

- Melinis minutiflora* P. Beauv. Kifuta (Uganda) ; Upatu (Bondei).  
Insecticide (whole plant).  
*Panicum trichocladum* Hack. Soromota, Kokoo (Chagga) ; Mkoko  
(Sukuma). Antidote for poisoning with *Synadenium Volkensii*  
(juice).  
*Pennisetum clandestinum* Hochst. Uzuo, Chikoko (Chagga). Styptic  
(whole plant).  
*Sporobolus indicus* var. *tenacissimus* A. Peter. Igeri, Ikeri (Chagga) ;  
Ol erigeru, Ol bulugai (Masai). Styptic (whole plant).

### III—CONTRIBUTIONS TO THE FLORA OF SIAM. ADDITAMENTUM XLI.\*

***Ardisia alata* Fletcher** [Myrsinaceae—Eumyrsineae] ; *A. porosae* C. B. Clarke affinis sed foliis maioribus, petiolo alato, panicula minore puberula, floribus glandulosioribus differt.

*Frutex* circa 0·3 m. altus (ex *Kerr*) ; ramuli crassi, primo puberuli, mox glabrescentes, brunnei. *Folia* oblongo-elliptica, apice obtusa, basi valde attenuata in petiolum decurrentia, 25–35 cm. longa, 8–10 cm. lata, chartacea vel subcoriacea, supra grisea subtus pallidiora, utrinque glabra glandulosa, punctulis bene prominulis, costa supra conspicua vel leviter impressa subtus prominente, nervis lateralibus 10–12-paribus subtus prominulis parallelis intra marginem arcuatis, margine integra valde recurva, petiolo alato circa 1 cm. longo canaliculato glabro suffulta. *Inflorescentia* terminalis, pendula, minute ferrugineo-puberula, racemosa, circa 5 cm. longa ; pedicelli ad 3 mm. longi. *Sepala* basi breviter coalita, ovata, 2 mm. longa, 1·75 mm. lata, dorso sparse puberula, bene glandulosa, ciliolata. *Corolla* punicea (ex *Kerr*) 4 mm. longa ; lobi ovati, 3 mm. longi, 2 mm. lati, valde punctati. *Stamina* 2·5 mm. longa, antheris subsessilibus acutis dorso eglandulosis. *Ovarium* globosum, 1 mm. diametro, glandulosum ; stylus 3–4 mm. longus.

Takuapa, Kapong, c. 100 m., by stream in evergreen forest, *Kerr* 17125.

This species, unlike so many *Ardisias*, has definite characters. Although its nearest relationship is with *A. porosa* C. B. Clarke, it stands quite distinct from that species and from all others in the subgenus *Acrardisia* Mez.

***Ardisia aprica* Fletcher** [Myrsinaceae—Eumyrsineae] ; *A. litorali* Andr. affinis sed inflorescentia haud simplicissime racemosa, sepalis pedicellisque minoribus differt.

*Frutex* circa 20 cm. altus (ex *Kerr*) ; ramuli crassi, rugosi, glabri, brunnei vel rubro-brunnei. *Folia* elliptica vel obovata, apice obtusa vel rotundata, basi attenuata, 6–15 cm. longa, 3–6 cm. lata, coriacea, supra grisea vel griseo-brunnea, subtus pallidiora, utrinque glabra, glandulosa, punctulis bene prominulis, costa supra subconspicua

\* Continued from K.B. 1936, 47.

subtus prominente, nervis lateralibus 6-8-paribus subtus prominulis parallelis intra marginem arcuatis, margine integra, leviter recurva, petiolo 5-10 mm. longo crasso supra canaliculato glabro suffulta. *Inflorescentia* axillaris, glabra, ex umbellis racemiformiter dispositis constituta; pedunculi 5-10 mm. longi; pedicelli 2-4 mm. longi, glandulosi. *Sepala* basi breviter coalita, ovata, 1-1.5 mm. longa, 1.5 mm. lata, apice obtusa vel subrotundata, glabra, glandulosa, ciliata. *Petala* punicea (ex *Kerr*) ovata, 5.5 mm. longa, 2.5-3 mm. lata, glandulosa. *Stamina* 4 mm. longa, antheris 3.5 mm. longis apice acutis dorso valde punctatis. *Ovarium* globosum 1.5 mm. diametro; stylus 4 mm. longus. *Bacca* globosa, circa 6 mm. diametro, conspicue glandulosa.

Chaipayum, Chaturat, c. 200 m., covering large areas of open ground, *Kerr* 19941.

***Ardisia attenuata*** Wall. var. ***pubescens*** Fletcher [Myrsinaceae—Eumyrsineae]; a typo ramulis pubescentibus differt.

Prachuap, Hui Yang, under 50 m., by stream in evergreen forest, *Kerr* 10762.

***Ardisia betongensis*** Fletcher [Myrsinaceae—Eumyrsineae]; *A. chrysophyllifoliae* King et Gamble affinis sed pedicellis pedunculisque longioribus differt.

*Arbor* circa 12 m. alta (ex *Kerr*); ramuli teretes vel obtuse quadrangulares, pilosi vel paene glabri, brunnei. *Folia* elliptica vel oblongo-elliptica, apice obtusa vel subacuta, basi valde cuneata, 7-15 cm. longa, 2-4.5 cm. lata, chartacea, utrinque viridi-brunnea, nitida, glabra, glandulosa, costa supra impressa subtus prominente, nervis lateralibus numerosis parallelis prominulis, margine integra, revoluta, petiolo circa 10-12 mm. longo supra canaliculato leviter alato sparse piloso suffulta. *Inflorescentiae* pauciflorae simplicissimae perabbiataeque petiolos aquantes, umbellatae vel corymbosae, pedicellis gracilibus circa 10 mm. longis puberulis. *Flores* ante anthesin obtusi 3 mm. longi. *Sepala* basi breviter coalita, ovata vel ovato-oblonga, dorso puberula, margine minutissime ciliolata. *Petala* alba (ex *Kerr*) basi brevissime connata, ovata, 3-3.5 mm. longa, 3 mm. lata, apice obtusa, sparse glandulosa. *Stamina* petalis aequalia; filamenta 1 mm. longa; antherae 2.5 mm. longae apice tenuiter acuminatae haud punctatae. *Ovarium* ovoideum, 1 mm. diametro, glabrum.

Betong, Gunong Ina, c. 1100 m., evergreen forest, *Kerr* 7598.

This plant with its axillary inflorescences shorter than the petiole clearly belongs to the section *Pimelandra* (A.DC.) Mez.

***Ardisia Collinsae*** Fletcher [Myrsinaceae—Eumyrsineae]; *A. pendulae* Mez affinis sed sepalis pedicellisque minoribus differt; nec non *A. penduliflorae* Pitard affinis sed pedicellis petiolisque minoribus, gemma terminali vegetativa puberula et glandulosa, nec glabra et eglandulosa differt.

*Frutex* circa 4 m. altus (ex *Kerr*); ramuli teretes, primo puberuli, mox glabri, rugosi, brunnei vel griseo-brunnei. *Folia* elliptica vel oblongo-elliptica, apice acuta vel subacuta, basi cuneata, 12–25 cm. longa, 4–7 cm. lata, chartacea vel subcoriacea, supra brunnea, viridi-tincta, subtus pallidiora, utrinque glabra, lepidibus minutissimis peradpressis consita, glandulosa, costa supra impressa subtus prominente, nervis lateralibus 10–12-paribus supra subconspicuis subtus prominulis, margine integra, petiolo circa 5 mm. longo supra canaliculato sparse puberulo vel glabro suffulta. *Inflorescentia* lateralis, racemosa, pendula, ad 10 cm. longa, submultiflora, ferrugineo-puberula; pedicelli ad 1 cm. longi. *Sepala* basi breviter coalita, late ovata, apice rotundata, 2 mm. longa, 2 mm. lata, dorso puberula, glandulosa, margine valde ciliata. *Corolla* 6 mm. longa; lobi late ovati, 5 mm. longi, 3–4 mm. lati, obtusi, valde punctati. *Stamina* 4 mm. longa, antheris subsessilibus acutis dorso valde punctatis. *Bacca* immatura, globosa, circa 5 mm. diametro, rubro-glandulosa.

Kaw Chang, Klawng Kloi, c. 20 m., evergreen forest, *Kerr* 9258. Near Sriracha, c. 5–10 m., *Mrs. D. J. Collins* 1822, 1973. Between Sriracha and Nawng Kaw, *Mrs. D. J. Collins* 460 (*type*).

***Ardisia cordulata* Fletcher** [Myrsinaceae—Eumyrsineae]; *A. odontophyllae* Wall. affinis sed foliis basi rotundatis vel cordulatis nec valde attenuatis, inflorescentia corymbosa nec paniculata differt.

*Frutex* circa 50 cm. altus (ex *Kerr*); ramuli obtuse quadrangulares vel teretes, juventute puberuli, mox glabri, brunnei. *Folia* elliptica vel leviter obovata, apice longius acuta, basi rotundata vel cordulata, 10–15 cm. longa, 4–6 cm. lata, membranaceo-chartacea, supra griseo-viridia subtus pallidiora, supra juventute longius puberula mox glabra, subtus longius adpresso-puberula, glandulosa, nervis supra leviter impressis, costa subtus prominente, nervis lateralibus circa 10–12-paribus subtus prominulis intra marginem arcuatis, margine fimbriato-denticulata, petiolo 1–4 cm. longo supra canaliculato primo piloso mox puberulo suffulta. *Corymbi* laterales usque ad 2 cm. diametro; pedunculi 3–5 cm. longi puberuli; pedicelli 5–8 mm. longi, graciles, apicem versus paullo incrassati, puberuli. *Sepala* basi breviter coalita, ovata, 1.75 mm. longa 1 mm. lata, extra puberula, valde ciliolata, paucipunctata. *Petala* basi breviter connata, ovata vel ovato-oblonga, 3.5 mm. longa, 2 mm. lata, apice obtusa vel rotundata, valde glandulosa. *Antherae* 2.75 mm. longae acutae dorso haud punctatae filamentis brevissime sed manifeste corollae affixis. *Ovarium* globosum 1 mm. diametro, glandulosum; stylus 4 mm. longus.

Pattani, Betong, c. 600 m., evergreen forest by stream, *Kerr* 7902.

***Ardisia cordulata* Fletcher** var. **appresso-hirsuta** *Fletcher* varietas nova; nervis appresso-hirsutis nec appresso-puberulis, pedunculis minoribus a typo recedit.

Pattani, Bukit, *Put* 3612.



***Ardisia cordulata* Fletcher var. *patulo-hirsuta* Fletcher**, varietas nova altera nervis patulo-hirsutis pedunculis minoribus a typo differt.

Trang, Kao Soi Dao, c. 800 m., evergreen forest, *Kerr* 19200.

***Ardisia eglandulosa* Fletcher** [Myrsinaceae—Eumyrsineae]; *A. tenerae* Mez affinis sed pedicellis brevioribus, floribus baccisque minoribus, corolla eglandulosa differt.

*Frutex*; ramuli teretes vel obtuse quadrangulares, rugosi, glabrescentes, cortice brunneo vel cinereo obtecti. *Folia* lanceolata vel leviter oblanceolata, apice obtusa vel subacuta, basi cuneata, 6–12 cm. longa, 1·5–3 cm. lata, chartacea, supra brunnea, viriditincta, subtus pallidiora, utrinque glabra, glandulis minutis translucidis vestita, subtus lepidibus minutissimis ferrugineis peradpressis consita, costa supra impressa subtus prominente, nervis lateralibus numerosis parallelis utrinque obscuris vel leviter subprominulis, margine integra recurva, petiolo 5–10 mm. longo supra canaliculato glabro suffulta. *Inflorescentiae* laterales, pauciflorae, ex umbellis paucis corymbosim compositae, sparse puberulae vel glabrae; pedicelli ad 5 mm. longi. *Sepala* basi breviter coalita, ovata, 1 mm. longa, 0·75 mm. lata acuta, ciliata, eglandulosa. *Corolla* 4 mm. longa; lobi ovati, 3 mm. longi et lati, eglandulosi. *Stamina* 2 mm. longa, antheris valde acuminatis dorso sparse punctatis. *Ovarium* ovoideum, 1 mm. diametro; stylus 4 mm. longus. *Bacca* subglobosa circa 5 mm. diametro.

Korat, Kao Lêm, *Put* 3519 (*type*). Nakawn Sritamarat, Kao Luang, c. 1750 m., *Dr. Eryl Smith* 739.

The Kao Luang plant, represented by a small twig only, has a larger inflorescence than the Korat plant and when further material be available it may prove to be a distinct species.

***Ardisia ferrugineo-pilosa* Fletcher** [Myrsinaceae—Eumyrsineae]; *A. cymosae* Blume affinis sed floribus eglandulosis differt; nec non *A. pedunculosa* Wall. affinis sed inflorescentia pilosa nec glabra, floribus minoribus differt.

*Frutex* circa 1·5 m. altus (ex *Kerr*); ramuli teretes vel obtuse quadrangulares, rugosi, primo ferrugineo-pilosi, mox glabri, cortice brunneo vel cinereo obtecti. *Folia* elliptica vel leviter oblongo-elliptica, apice obtusa, basi cuneata, 10–20 cm. longa, 3·5–6 cm. lata, chartacea, grisea vel griseo-brunnea, utrinque glabra, glandulosa punctulis bene prominulis, subtus lepidibus minutissimis ferrugineis peradpressis consita, costa supra subconspicua vel leviter impressa, subtus prominente, nervis lateralibus numerosis parallelis utrinque prominulis, margine integra leviter recurva, petiolo 1–1·5 cm. longo supra canaliculato puberulo vel glabro suffulta. *Inflorescentiae* laterales, submultiflorae, ex umbellis paucis corymbosim compositae, ferrugineo-pilosae; pedunculi circa 15 mm. longi; pedicelli ad 10 mm. longi. *Sepala* basi breviter coalita, triangularia acuta 0·75 mm. longa et lata, dorso sparse pilosa, eglandulosa, ciliolata. *Petala*

punicea (ex *Kerr*) late ovata, acuta, circa 3 mm. longa et lata, eglandulosa. *Stamina* 2.5 mm. longa, antheris acutis eglandulosis. *Ovarium* ovoideum 1 mm. diametro; stylus circa 4 mm. longus. *Bacca* globosa, circa 5 mm. diametro.

Nakawn Sritamarat, Ban Natawn, c. 50 m., evergreen forest, *Kerr* 15644. Pattani, Kao Kalakiri, c. 400 m., evergreen forest, *Kerr* 15016 (*type*).

***Ardisia fimbriata* Fletcher** [Myrsinaceae—Eumyrsineae]; *A. odontophyllae* Wall. affinis sed foliis glabris oblongis angustioribus basi attenuatioribus, sepalis vel rotundatis non acutis differt.

*Frutex* ad 2 m. altus (ex *Kerr*); ramuli saepe crassi, obtuse quadrangulares vel teretes, primo sparse puberuli mox glabri, brunnei vel griseo-brunnei, lenticellis paucis conspicue elevatis praediti. *Folia* oblongo-elliptica, apice attenuata, acuta, basi cuneata, 10–25 cm. longa, 3–8 cm. lata, chartacea, supra olivaceo-viridia brunneo-tincta, subtus pallidiora, griseo-brunnea, utrinque glabra, costa supra subconspicua subtus valde prominente, nervis lateralibus 20–30-paribus supra conspicuis subtus prominulis parallelis intra marginem arcuatim junctis, margine fimbriato-denticulata, petiolo 1.5–3 cm. longo supra manifeste canaliculato glabro suffulta. *Inflorescentiae* axillares nunc e bracteis parvis nunc e foliorum normalium axillis provenientes, nunc simplices corymbiformes nunc pauperrime paniculatae ex corymbis compositae, nutantes, circa 10 cm. longae, pedicellis gracilibus apicem versus paullo incrassatis 5–8 mm. longis. *Calycis* lobi ovati vel subrotundati, 1 mm. longi, 0.75 mm. lati, glabri, glandulosi. *Corolla* immatura; lobi 4 mm. longi, 3 mm. lati, ovati, apice obtusi, glabri, punctis parvis brunneis praediti. *Stamina* 2.5 mm. longa, antheris obtusis dorso punctatis.

Kanburi, Kao Ri Yai, c. 1400 m., evergreen forest, *Kerr* 10374.

***Ardisia fulva* King et Gamble var. *ciliata* Fletcher** [Myrsinaceae—Eumyrsineae]; a typo petalis ciliatis dorso pubescentibus differt.

Satul, Kuan Po, c. 20 m., savannah, shrub c. 1.5 m., flowers pink, *Kerr* 13826.

***Ardisia Garrettii* Fletcher** [Myrsinaceae—Eumyrsineae]; *A. solanaceae* Roxb. affinis sed foliis chartaceis oblongioribus, floribus minoribus, pedunculis pedicellisque gracilioribus differt.

*Frutex* circa 2 m. altus (ex *Garrett*); ramuli teretes vel obtuse quadrangulares, glabri, brunnei vel griseo-brunnei. *Folia* oblonga vel oblanceolata vel obovata, apice acuminata, obtusa vel subacuta, basi attenuata, 8–15 cm. longa, 2.5–5 cm. lata, chartacea, supra grisea vel griseo-brunnea, viridi-tincta, subtus pallidiora, utrinque glabra, lepidibus minutissimis peradpressis consita, glandulosa, costa leviter impressa subtus prominente, nervis lateralibus 10–12-paribus parallelis subtus prominulis intra marginem arcuatis, margine integra, petiolo 5–10 mm. longo canaliculato glabro suffulta. *Inflorescentia* axillaris, umbellata vel racemosa, 4–8-flora, glabra; pedunculi 4.5 cm. longi; pedicelli 1.5–2.5 cm. longi, graciles, apicem versus

incrassati, punctati. *Calycis* lobi late ovati, 3 mm. longi, 4 mm. lati, apice rotundati, dorso multipunctati glanduloso-ciliati. *Corollae* tubus 1.5 mm. longus; lobi ovati 7–8 mm. longi, 5–6 mm. lati, valde glandulosi. *Stamina* 6.5 mm. longa, antheris subsessilibus acutis dorso valde punctatis. *Ovarium* globosum 1.5 mm. diametro, glandulosum; stylus 7 mm. longus glandulosus.

Chiangmai, Me Kang, 1330 m., evergreen forest by stream, *Winit* 1321. Doi Sutep, c. 1650 m., thick evergreen forest, *Kerr* 3594. Doi Angka, Me Ka Pak drainage, c. 1590 m., *Garrett* 667 (*type*). Doi Chiangdao, c. 1800 m., common in evergreen forest, *Kerr* 6572. Raheng, Hui Um Pa, c. 600 m., evergreen forest, *Winit* 229.

***Ardisia impressa* Fletcher** [Myrsinaceae—Eumyrsineae]; *A. undulato-dentatae* Fletcher affinis sed foliis maioribus, nervis lateralibus supra impressis subtus patentibus, margine altius undulato-dentata differt.

*Frutex*; ramuli obtuse quadrangulares vel teretes, primo sparse puberuli mox glabri, brunnei vel griseo-brunnei. *Folia* elliptica vel oblongo-elliptica vel leviter obovata, apice acuta vel obtusa, basi longius attenuata, 12–20 cm. longa, 3–7 cm. lata, coriacea, supra viridia, brunneo-tincta, nitida, subtus pallidiora, brunneo-viridia, rubro-glandulosa, utrinque glabra, nervis supra impressis, costa subtus prominente, nervis lateralibus numerosis prominulis parallelis patentibus intra marginem arcuatis, margine undulato-dentata basi integra leviter recurva, petiolo 1 cm. longo supra valde canaliculato leviter alato glabro suffulta. *Inflorescentia* lateralis, corymbosa vel umbellata, furfuraceo-puberula, pedunculo communi vix evoluto vel 15 mm. longo, pedunculis partialibus ad 15 mm. longis, pedicellis 8–15 mm. longis saepe pendulis. *Sepala* basi breviter coalita, deltoidea, 1.5 mm. longa et lata, extra dense furfuracea, minute ciliata, conspicue glandulosa. *Corolla* punicea (ex *Kerr*); tubus circa 1.75 mm. longus; lobi ovati, circa 3 mm. longi, apice rotundati, minute rubro-glandulosi. *Stamina* corollae subaequalia, antheris acutis 3 mm. longis. *Ovarium* globosum 1 mm. diametro. *Bacca* rubra circa 7 mm. diametro, sparse puberula vel glabra, glandulosa.

Lampun, Mê Li, c. 400 m., moist mixed forest, *Winit* 1538. Korat, Ban Ta Chang, *Put* 3504. Sriracha, *Mrs. D. J. Collins* 1040. Sriracha, Nawng Nam Kio, c. 150–250 m., *Mrs. D. J. Collins* 1271. Kanburi, Baw Rê, *Put* 216 (*type*).

A rather variable species from the point of view of the inflorescence in that the common and partial peduncles sometimes are very well developed and at other times wanting.

***Ardisia langsuanensis* Fletcher** [Myrsinaceae—Eumyrsineae]; *A. lanceolatae* Roxb. affinis sed foliis ellipticis, inflorescentia glabra, sepalis minoribus differt; nec non *A. sumatranæ* Miq. affinis sed pedicellis petiolisque longioribus, baccis maioribus differt.

*Arbor* parva circa 6 m. alta (ex *Kerr*); ramuli validi, teretes vel leviter complanati, glabri, cortice brunneo vel cinereo obtecti.



*Folia* elliptica vel oblongo-elliptica, apice acuta, basi cuneata, 18-22 cm. longa, 6-8 cm. lata, chartacea vel chartaceo-coriacea, supra brunnea, viridi-tincta, subtus pallidiora utrinque glabra, glandulosa, punctulis bene prominulis, costa supra leviter impressa subtus prominente, nervis lateralibus numerosis parallelis subtus prominulis intra marginem arcuatim junctis, margine integra parum recurva, petiolo circa 2 cm. longo supra canaliculato glabro suffulta. *Inflorescentia* terminalis, multiflora, glabra, ex umbellis racemiformiter dispositis constituta; pedunculi circa 3 mm. longi; pedicelli circa 1.5 cm. longi. *Sepala* in fructu basi breviter coalita, latissime ovata, apice rotundata, 2 mm. longa, 2 mm. lata, glabra, multipunctata, glanduloso-ciliata. *Corolla* non visa. *Bacca* subglobosa, circa 8 mm. diametro, glandulosa, glabra.

Langsuan, Kao Nom Sao, c. 500 m., evergreen forest, *Kerr* 12025.

***Ardisia lenticellata* Fletcher** [Myrsinaceae—Eumyrsineae]; *A. virenti* Kurz affinis sed foliis anguste lanceolatis differt; nec non *A. crispae* A.DC. affinis sed calycis lobis oblongis nec ovatis vel ellipticis differt.

*Frutex* circa 2 m. altus (ex *Kerr*); ramuli obtuse quadrangulares vel teretes, glabri, virides vel griseo-virides, lenticellis numerosis atris non elevatis praediti. *Folia* lanceolata, apice acuminata, obtusa vel subacuta, basi cuneata, 10-18 cm. longa, 2-4 cm. lata, chartacea, punctulis parvis prominulis conspersa, utrinque viridia glabraque, costa supra subconspicua vel subimpressa subtus prominente, nervis lateralibus numerosis parallelis supra conspicuis subtus prominulis, margine crispato-crenata, leviter recurva, petiolo 8-10 mm. longo valde canaliculato leviter alato glabro suffulta. *Inflorescentiae* multiflorae ex umbellis multifloris longe stipitatis compositae bipinnatim paniculatae glabrae; pedicelli graciles, circa 15 mm. longi. *Sepala* basi breviter coalita, oblonga vel ovato-oblonga, 2-5 mm. longa, 1-1.5 mm. lata, glabra, valde punctata. *Corolla* punicea (ex *Kerr*); tubus brevis; lobi ovato-oblongi, obtusi vel subacuti, 7-7.5 mm. longi, 5 mm. lati, sparse punctati, intra basi papilloso. *Antherae* acutae dorso atro-punctatae filamentis paullo super basin corollae breviter affixis. *Ovarium* ovoideum 1 mm. diametro punctatum; stylus 5 mm. longus.

Prachuap, Kao Luang, c. 800-1000 m., evergreen forest, *Kerr* 10812 (*type*), *Kerr* 10836. Ranawng, Kao Pawta Chongdong, c. 900 m., evergreen forest, *Kerr* 16784.

***Ardisia longipedicellata* Fletcher** [Myrsinaceae—Eumyrsineae]; *A. crispae* A.DC. affinis sed pedicellis longioribus differt; nec non *A. maculosae* Mez affinis sed inflorescentia glabra haud puberula differt.

*Frutex* circa 0.5 m. altus (ex *Kerr*); ramuli obtuse quadrangulares vel teretes, glabri, grisei vel griseo-brunnei. *Folia* elliptica vel oblongo-elliptica, apice acuminata, subacuta vel obtusa, basi cuneata, 8-15 cm. longa, 2.5-4 cm. lata, chartacea, supra olivaceo-

viridia, subtus pallidiora, utrinque glabra, sparse punctata, costa supra subconspicua vel leviter impressa, subtus prominente, nervis lateralibus 8–10-paribus utrinque prominulis parallelis intra marginem arcuatim junctis, margine levissime grosse crenata, recurvata, petiolo circa 5–10 mm. longo supra canaliculato glabro suffulta. *Inflorescentia* terminalis, multiflora, simplicissima corymbosa, glabra; pedicelli ad 3 cm. longi, crassi; bractae mox deciduae. *Calycis* lobi basi breviter coaliti, oblongi, in fructu 3–3.5 mm. longi, 1.5 mm. lati, eglandulosi, glabri. *Bacca* rubra (ex *Kerr*) globosa circa 5–7 mm. diametro.

Nawngkai, Chaiyaburi, c. 200 m., evergreen forest, *Kerr* 8523.

This species is quite distinct from *Kerr* 8523A—*A. stipitata* Fletcher, which has deltoid glandular not oblong eglandular calyx segments, more glandular and thinner leaves and the intramarginal nerve farther in from the margin.

***Ardisia multipunctata* Fletcher** [Myrsinaceae—Eumyrsineae]; *A. fulvae* Ridl. affinis sed inflorescentia pauciflora, sparse nec valde puberula, antheris subsessilibus, nervulis prominulioribus differt.

*Arbor* parva circa 5 m. alta (ex *Kerr*); ramuli teretes, primo sparse pilosi mox glabri, brunnei vel griseo-brunnei. *Folia* elliptica vel leviter oblongo-elliptica, apice acuminata, acuta, basi attenuata, 6–12 cm. longa, 2.5–4 cm. lata, chartacea vel subcoriacea, supra viridia vel viridi-brunnea, subtus brunnea vel griseo-brunnea, utrinque glabra, lepidibus minutissimis peradpressis consita, glandulosa, costa supra leviter impressa, subtus prominente, nervis lateralibus numerosis parallelis utrinque prominulis, margine integra, petiolo 1–1.5 cm. longo supra canaliculato puberulo vel glabro suffulta. *Inflorescentia* lateralis, fere biflora, sparse puberula; pedunculi 1–2 cm. longi; pedicelli 1.5–2 cm. longi, apicem versus incrassati. *Sepala* basi manifeste coalita, late ovata vel rotundata, 1.5 mm. longa, 2 mm. lata, dorso puberula, multipunctata, valde ciliata. *Petala* punicea (ex *Kerr*) ovata, 6 mm. longa, 4.5 mm. lata, apice obtusa vel rotundata, valde glandulosa. *Stamina* 4.5 mm. longa, antheris subsessilibus acutis dorso punctatis. *Ovarium* globosum 2 mm. diametro; stylus 4.5 mm. longus.

Kao Kalakiri, c. 800 m., evergreen forest, *Kerr* 14986.

***Ardisia Murtonii* Fletcher** [Myrsinaceae—Eumyrsineae]; *A. porosae* C. B. Clarke affinis sed inflorescentia puberula, calycis lobis obtusis vel rotundatis glandulosis, nec acutis et paene eglandulosis differt; nec non *A. rigidae* Kurz affinis sed pedicellis longioribus differt.

*Frutex* circa 1.5 m. altus (ex *Kerr*); ramuli quadrangulares, glabri, griseo-brunnei. *Folia* elliptica vel oblongo-elliptica, apice obtusa, basi cuneata vel subrotundata, 15–20 cm. longa, 5–7 cm. lata, coriacea, supra brunnea vel griseo-brunnea, subtus pallidiora, utrinque glabra, costa supra subconspicua subtus prominente, nervis lateralibus 12–14-paribus supra leviter impressis subtus prominulis parallelis, intra marginem arcuatim junctis, margine

integra, petiolo ad 5 mm. longo leviter alato glabro suffulta. *Inflorescentia* terminalis ad 25 cm. longa, paniculata, multiflora, puberula; pedicelli 5–10 mm. longi. *Sepala* basi breviter coalita, ovata, 2 mm. longa, 2 mm. lata, apice obtusa vel rotundata, dorso sparse puberula, conspicue punctata, ciliolata. *Corolla* purpurea (ex *Kerr*); lobi ovato-lanceolati, 7 mm. longi, 2.5–3 mm. lati, apice obtusi, glandulosi. *Stamina* petalis subaequalia antheris 5 mm. longis lanceolatis acutis dorso punctatis. *Ovarium* globosum circa 1.5 mm. diametro; stylus 7 mm. longus.

Kaw Chang, Klawng Nonsi, c. 10 m., evergreen scrub, *Kerr* 9195 (*type*). *Dr. Eryl Smith* 282. *Murton* 11. Chantabun, Klung c. 50 m., evergreen forest, *Kerr* 10020.

*Murton* 11 is quoted by Mez [Engler Pflanzenr., Myrsinaceae 139 (1902)], along with the type, *Helper* 3563 from Tenasserim, under *A. rigida* Kurz. The two collections are quite distinct. *Helper* 3563 has pedicels which are never more than 2.5 mm. in length—the length given by Mez in his description of *A. rigida*. The Kaw Chang plant has pedicels 10 mm. or sometimes more, in length.

***Ardisia nervosa* Fletcher** [Myrsinaceae—Eumyrsineae]; ab affini *A. Kerrii* Craib, foliis ellipticis vel leviter obovatis nec oblanceolatis nec obovato-oblanceolatis, apice obtusis nec abrupte acuminatis, floribus parum maioribus differt.

*Arbor* circa 8 m. alta (ex *Kerr*); ramuli obtuse quadrangulares vel teretes, primo ferrugineo-puberuli mox glabri, cortice cinereo obtecti. *Folia* elliptica vel leviter obovata, apice late obtusa, basi cuneata, 7–14 cm. longa, 2–4.5 cm. lata, chartacea vel subcoriacea, supra griseo-brunnea, subtus pallidiora, utrinque glabra, subtus lepidibus minutis ferrugineis instructa, costa supra impressa subtus prominente, nervis lateralibus utrinque numerosis parallelis supra conspicuis subtus prominulis, margine integra vel leviter crenata, petiolo circa 5 mm. longo canaliculato glabro suffulta. *Inflorescentia* submultiflora, e corymbis pinnatim dispositis constituta, foliis brevior; pedicelli graciles 4–7 mm. longi, sparse puberuli vel glabri. *Calycis* lobi deltoidei vel ovati, obtusi, 0.75–1 mm. longi, 1 mm. lati, valde ciliolati. *Corollae* tubus 0.75 mm. longus; lobi ovati, subacuti, 3 mm. longi, 2–5 mm. lati, glabri, eglandulosi. *Stamina* corollae subaequalia, antheris acuminatis. *Stylus* ante anthesin exsertus tandem porrectus, 5 mm. longus. *Ovarium* ovoideum 1 mm. diametro. *Bacca* 5 mm. diametro.

Chiangdao, Mùang Hêng, c. 700 m., evergreen forest by stream, *Kerr* 5515 (*type*). Mùang Chêm, Doi Ngao, c. 300 m., evergreen forest, *Kerr* 5440. Kanburi, Baw Rê, *Put* 225.

***Ardisia pedunculata* Fletcher** [Myrsinaceae—Eumyrsineae]; *A. undulato-dentatae* Fletcher affinis sed pedunculis longioribus, calycis lobis maioribus differt.

*Frutex* circa 1.5 m. altus (ex *Kerr*); ramuli obtuse quadrangulares vel teretes, minute puberuli, brunnei. *Folia* elliptica vel



leviter obovata, apice acuminata, acuta, basi cuneata vel cuneato-rotundata, 8-16 cm. longa, 2.5-5 cm. lata, chartacea, utrinque brunnea nitida, glabra, sparse flavo-glandulosa, costa supra conspicua vel leviter impressa subtus prominente, nervis lateralibus 10-12-paribus supra subconspicuis subtus prominulis parallelis intra marginem arcuatim junctis, margine undulato-dentata, basi integra, leviter recurva, petiolo circa 5 mm. longo supra canaliculato puberulo vel glabro suffulta. *Inflorescentia* lateralis, simplicissime corymbosa, pedunculo circa 6 cm. longo furfuraceo-puberulo apice 1-foliolato, pedicellis 15-20 mm. longis puberulis gracilibus. *Calycis* lobi ovati vel ovato-oblongi, 3.5-4 mm. longi, 2 mm. lati leviter acuminati, acuti, extra puberuli, fimbriolati, glandulosi. *Corollae* lobi basi breviter connati, ovati, 7-8 mm. longi, 3-3.5 mm. lati, apice acuminati, acuti, valde punctati. *Stamina* petalis breviora, antheris 5 mm. longis sagittatis acutis dorso punctatis, filamentis brevibus. *Ovarium* ovoideum, glandulosum 1 mm. diametro; stylus 5 mm. longus.

Surat, Ban Kawp Kêp, c. 50 m., evergreen forest, *Kerr* 13403.

***Ardisia penduliflora* Pitard var. *microsepala* Fletcher** [Myrsinaceae—Eumyrsineae], a typo sepalis minoribus pedicellis maioribus differt.

Ranawng, Kaw Bangben, c. 50 m., evergreen forest, *Kerr* 16655.

***Ardisia pilosa* Fletcher** [Myrsinaceae—Eumyrsineae]; *A. villosae* Roxb. affinis sed foliis minoribus coriaceis paene glabris, sepalis minoribus ovatis glabris vel subpilosis nec oblongis pilosis differt.

*Frutex* parvus circa 0.5 m. altus (ex *Kerr*); ramuli quadrangulares vel paene teretes, primo pilosi mox glabrescentes, brunnei. *Folia* elliptica, 2.5-7 cm. longa, 1-3 cm. lata, apice obtusa, basi cuneata vel cuneato-rotundata, subcoriacea, griseo-brunnea, manifestius punctata, supra glabra, subtus primo subpilosa mox glabrescentia (costa excepta) costa supra subconspicua subtus prominente, nervis lateralibus utrinque numerosis parallelis obscuris, margine grosse crenata leviter recurva, petiolo 3-5 mm. longo supra canaliculato piloso suffulta. *Inflorescentia* longe stipitata, basi foliis binis plerumque instructa, submultiflora, umbellata, ferrugineo-pilosa; pedicelli curvati, crassiusculi, 12-15 mm. longi; bracteae lanceolatae vel oblanceolatae, 2-5 mm. longae. *Calycis* lobi ovati vel ovato-deltoides, 2 mm. longi, 1.5 mm. lati, basi subpilosi ceterum glabri, paucipunctati. *Petala* punicea (ex *Kerr*) basi breviter connata, lobis ovatis 7 mm. longis 4 mm. latis glabris multipunctatis. *Stamina* petalis breviora antheris obtusis dorso punctatis, filamentis brevissime affixis. *Ovarium* 1.5 mm. diametro, glabrum; stylus 7 mm. longus. *Bacca* rubra (ex *Kerr*) globosa, 7 mm. diametro, paucipunctata.

Lôi, Kao Krading, c. 1200 m., open grassy ground, *Kerr* 20111.

***Ardisia puberula* Fletcher** [Myrsinaceae—Eumyrsineae]; ab affini *A. Kerrii* Craib foliis lanceolatis, pedicellis brevioribus sepalis petalisque glandulosis differt.

*Arbor* circa 5 m. alta (ex *Kerr*); ramuli teretes, primo ferrugineo-puberuli, mox glabrescentes, cortice cinereo obtecti. *Folia* lanceolata vel oblongo-elliptica, apice obtusa, basi cuneata, 8–12 cm. longa, circa 2 cm lata, chartacea, supra griseo-brunnea, subtus brunnea, utrinque glabra, subtus lepidibus minutis ferrugineis instructa, costa supra impressa subtus prominente, nervis lateralibus numerosis parallelis supra saepe obscuris subtus prominulis, margine integra, petiolo circa 5–10 mm. longo supra canaliculato glabro suffulta. *Inflorescentia* submultiflora, e corymbis pinnatim dispositis constituta, foliis brevior, furfuraceo-puberula; pedunculi 2–3 mm. longi; pedicelli 1.5–2 mm. longi. *Calycis* lobi deltoidei vel ovati, apice obtusi, 1 mm. longi, 1 mm. lati, glandulosi, ciliolati. *Corollae* tubus 0.75 mm. longus; lobi ovati, 3 mm. longi, 2.5 mm. lati, apice acuti vel subacuti, rubro-glandulosi, glabri. *Stamina* 2 mm. longa, antheris acutis dorso-punctatis. *Ovarium* ovoideum 1 mm. diametro; stylus ante anthesin exsertus tandem porrectus, 4 mm. longus.

Pattani, Bukit, c. 300 m., evergreen forest, *Kerr* 7099 (*type*). *Put* 3639.

***Ardisia punicea* Fletcher** [Myrsinaceae—Eumyrsineae]; ab affini *A. puberula* Fletcher inflorescentia maiore glabraque, petalis glandulisque paucioribus, foliis latioribus differt.

*Frutex* circa 3 m. altus (ex *Kerr*); ramuli obtuse quadrangulares, primo ferrugineo-puberuli mox glabri, cortice brunneo vel cinereo obtecti. *Folia* elliptica vel oblongo-elliptica, apice acuta vel subacuta, basi cuneata, 9–18 cm. longa, 2.5–4 cm. lata, chartacea, utrinque fusco-viridia glabraque, subtus lepidibus minutis ferrugineis instructa, costa supra impressa subtus prominente nervis lateralibus numerosis parallelis supra subconspicuis subtus prominulis, margine integra, petiolo circa 10 mm. longo supra canaliculato primo leviter puberulo mox glabro suffulta. *Inflorescentia* axillaris glabra, ex umbellis racemiformiter dispositis constituta, submultiflora, foliis brevior; pedunculi circa 8–15 mm. longi; pedicelli circa 5 mm. longi. *Calycis* lobi deltoidei, apice obtusi, 1 mm. longi, 1 mm. lati, valde glandulosi, ciliolati. *Corolla* punicea (ex *Kerr*), lobi ovati vel ovato-oblongi, apice rotundati, 3 mm. longi, 2 mm. lati, paucipunctati. *Stamina* corollae subaequalia, antheris 2 mm. longis acutis dorso paucipunctatis. *Ovarium* globosum 1 mm. diametro; stylus 5 mm. longus ante anthesin exsertus tandem porrectus.

Ranawng, Kao Pawta Luang Kêo, c. 1200 m., evergreen forest, *Kerr* 16944.

***Ardisia Rabilii* Fletcher** [Myrsinaceae—Eumyrsineae]; *A. villosae* Roxb. affinis sed inflorescentia laterali differt.

*Frutex* (ex *Rabil*); ramuli quadrangulares, primo valde pilosi mox glabrescentes, brunnei. *Folia* elliptica vel oblongo-elliptica, apice acuminata, basi valde cuneata, circa 16 cm. longa, 5–7 cm.

lata, membranacea, utrinque brunnea, manifestius punctata, supra primo subpilosa mox glabra, subtus subpilosa, costa utrinque pilosa supra conspicua subtus prominente, nervis lateralibus 10–12-paribus utrinque subconspicuis parallelis, margine leviter crenata, petiolo 5–10 mm. longo supra canaliculato piloso suffulta. *Inflorescentia* lateralis, pauciflora, umbellata, valde pilosa; pedicelli crassiusculi circa 10 mm. longi; bracteae lanceolatae vel oblanceolatae, 2–5 mm. longae. *Calycis* lobi ovati vel ovato-oblongi, 7 mm. longi, 2·5–3 mm. lati, subacuti, pilosi, glanduloso-punctati. *Corolla* non visa. *Ovarium* globosum, pilosum.

Tungsong, Ban Pa Prêk, evergreen forest, *Rabil* 177.

***Ardisia rubro-glandulosa* Fletcher** [Myrsinaceae—Eumyrsineae]; *A. cymosae* Blume affinis sed foliis lanceolatis, pedicellis longioribus, sepalis petalisque paene eglandulosis differt.

*Frutex*; ramuli teretes vel obtuse quadrangulares, primo ferrugineo-puberuli, mox glabrescentes, cortice cinereo obtecti. *Folia* lanceolata vel oblango-lanceolata, apice acuminata, obtusa, basi cuneata, 8–16 cm. longa, 1·5–4 cm. lata, coriacea, rubro-glandulosa, supra brunnea vel griseo-brunnea, viridi-tincta, subtus pallidiora, supra glabra, subtus lepidibus minutissimis ferrugineis peradpressis consita, costa supra impressa subtus prominente, nervis lateralibus numerosis parallelis utrinque prominulis, margine integra vel leviter crenulata, recurva, petiolo 5–10 mm. longo supra canaliculato ferrugineo-puberulo suffulta. *Inflorescentiae* (immaturae), axillares, multiflorae, ex umbellis stipitatis bipinnatim paniculatae, furfuraceae; pedunculi 5 mm. longi; pedicelli 2 mm. longi. *Sepala* basi breviter coalita, lanceolata, acuta, 1 mm. longa, 0·5 mm. lata, dorso furfuracea, ciliata, sparse minute glandulosa. *Corolla* immatura, 2 mm. longa, paucipunctata vel eglandulosa.

Chiengmai, Doi Lang Ka, *Put* 3762.

***Ardisia siamensis* Fletcher** [Myrsinaceae—Eumyrsineae]; *A. sanguinolentae* Wall. affinis sed sepalis rotundatioribus ciliatioribus, petalis puberulis, foliis ellipticis nec obovatis differt.

*Frutex* circa 1 m. altus (ex *Kerr*); ramuli obtuse quadrangulares primo sparse pilosi, mox glabri, brunnei, leviter rugosi. *Folia* elliptica vel leviter oblango-elliptica, apice acuta, basi cuneata, 7–15 cm. longa, 2·5 cm. lata, chartacea, supra brunnea, subtus pallidiora, utrinque glabra, glandulosa, punctulis prominulis, costa supra impressa subtus prominente, nervis lateralibus numerosis parallelis intra marginem arcuatis supra obscuris vel leviter conspicuis subtus prominulis, margine integra vel leviter crenata, petiolo circa 1 cm. longo supra canaliculato glabro suffulta. *Inflorescentia* lateralis, multiflora, e corymbis pinnatim dispositis constituta, puberula, pedunculis circa 2·5 cm. longis, pedicellis ad 12 mm. longis. *Sepala* basi coalita, ovata, 2·5–3 mm. longa, 2·5 mm. lata, apice rotundata, dorso puberula, valde punctata, ciliata. *Corolla* purpurea (ex *Kerr*) 7 mm. longa; lobi 6 mm. longi, 4 mm. lati, dorso puberuli valde



punctati. *Stamina* 4.5 mm. longa, antheris subsessilibus acutis dorso punctatis. *Ovarium* globosum 2 mm. diametro; stylus 5 mm. longus. *Bacca* globosa, circa 5 mm. diametro, glabra, lepidibus minutissimis peradpressis consita.

Chiengkam, c. 450 m., *Kerr* 2464 (*type*). Chiengmai, Ban Djan, c. 350 m., *Hosseus* 367. Chiengmai, Me Kan, c. 750 m., *Winit* 49. Chiengmai, Me Awn, c. 450 m., scrub jungle, edge of paddy fields, *Kerr* 4695. Chiengmai, bought in market, *Mrs. D. J. Collins* 1236. Pre, c. 150–180 m., *Vanpruk* 149. Lampang, Mè Yom, c. 110 m., sandy bank of river, *Winit* 1601. Lampang, Muang Lawng, c. 160 m., evergreen forest, *Winit* 1893. Nawng Bua, c. 300 m., evergreen forest, *Kerr* 8618. Chaiyapum, Nawng Bua Deng, c. 300 m., evergreen by stream, *Kerr* 20305.

***Ardisia stipitata* Fletcher** [Myrsinaceae—Eumyrsineae]; *A. longipedicellatae* Fletcher affinis sed sepalis deltoideis nec oblongis glandulosis nec eglandulosis differt.

*Frutex* circa 1 m. altus (ex *Kerr*), ramuli obtuse quadrangulares vel teretes, primo ferrugineo-puberuli mox glabri, grisei vel griseo-brunnei. *Folia* elliptica vel oblongo-elliptica vel oblongo-lanceolata, 6–16 cm. longa, 1–3 cm. lata, apice obtusa vel subacuta, basi cuneata, chartacea, griseo-brunnea, subtus parum pallidiora, utrinque glabra, costa supra subconspicua vel leviter impressa subtus valde prominente, nervis lateralibus numerosis parallelis utrinque prominulis 2 mm. intra marginem arcuatim junctis nervum intramarginalem distinctum formantibus, margine plus minusve crenulata vel paene integra, petiolo circa 3–7 mm. longo supra canaliculato ferrugineo-puberulo suffulta. *Inflorescentia* longe stipitata, basi foliis binis vulgo instructa, pauciflora, umbellata, in fructu ferrugineo-puberula; pedicelli crassiusculi, 10–15 mm. longi. *Calycis* lobi deltoidei, obtusi vel subacuti, 2 mm. longi et lati, extra puberuli, ciliolati, valde glandulosi. *Corolla* non visa. *Bacca* rubra, globosa, circa 6 mm. diametro, sparse puberula, glandulosa.

Nawngkai, Chaiyaburi, c. 200 m., evergreen forest, *Kerr* 8523A. TONKIN. Forêt de Than-Moi, *Balansa*, in Herb. Kew.

This plant is very distinct from the other members of the subgenus *Crispardisia* Mez, in having the continuous intra-marginal nerve as much as 2 mm. in from the margin and the marginal glands not in the crenations but opposite them on the marginal nerve. The Tonkin plant which I have seen, is quoted in Flore Générale de l'Indo-Chine iii. 857 under *A. chinensis* Benth. and is described as a *Crispardisia*. It bears no relationship to *A. chinensis* which has dentate or subdentate leaves and is therefore included in the subgenus *Bladhia* Mez.

***Ardisia subpilosa* Fletcher** [Myrsinaceae—Eumyrsineae]; *A. sanguinolentae* Wall. affinis sed floribus paucioribus, petalis eciliolatis, foliis ellipticis differt; nec non *A. multipunctatae* Fletcher affinis sed inflorescentia subpilosa nec sparse puberula, nervis lateralibus paucioribus differt.

*Frutex* circa 2 m. altus (ex *Kerr*) ; ramuli obtuse quadrangulares, primo pilosi mox glabri, cortice brunneo vel cinereo obtecti. *Folia* elliptica, apice acuminata, subacuta, basi cuneata vel subrotundata, 7-12 cm. longa, 3-6 cm. lata, chartacea, utrinque brunnea, glabra, lepidibus minutissimis peradpressis consita, glandulosa, costa supra leviter impressa subtus prominente, nervis lateralibus circa 8-paribus subtus prominulis parallelis intra marginem arcuatim junctis, margine integra vel leviter crenata, petiolo circa 5 mm. longo primo piloso mox glabro vel puberulo suffulta. *Inflorescentia* lateralis, 2-3-flora, subpilosa ; pedunculi circa 2 mm. longi ; pedicelli circa 1.5 cm. longi. *Calycis* lobi ovati, 3.5-4 mm. longi, 2.5-3 mm. lati, dorso puberuli, multipunctati, ciliolati. *Petala* punicea (ex *Kerr*) ovata, 7 mm. longa, 4-5 mm. lata, apice obtusa, multipunctata. *Stamina* 5-5.5 mm. longa, antheris subsessilibus acuminatis acutis dorso valde punctatis. *Ovarium* ovoideum, 2 mm. diametro ; stylus 6 mm. longus paucipunctatus.

Krabi, Tambon Kao Panom, c. 100 m., scrub, *Kerr* 18656.

***Ardisia translucida* Fletcher** [Myrsinaceae—Eumyrsineae] ; *A. maculosae* Mez affinis sed foliis glandulis numerosis pellucidis punctatis differt.

*Frutex* parvus circa 0.3 m. altus (ex *Kerr*) ; ramuli crassi, obtuse quadrangulares, primo sparse puberuli mox glabri, cinerei. *Folia* elliptica vel oblongo-elliptica, apice acuminata, acuta vel subacuta, basi cuneata, 15-20 cm. longa, 4-6 cm. lata, chartacea, glandulis numerosis translucidis munita, utrinque griseo-viridia glabraque, costa supra impressa subtus prominente, nervis lateralibus 12-14-paribus subtus prominentibus parallelis intra marginem arcuatis, margine leviter crenata, petiolo circa 1-2 cm. longo supra canaliculato primo puberulo mox glabro suffulta. *Inflorescentia* lateralis, pauciflora, umbellata, ferrugineo-puberula ; pedunculi 10 mm. longi ; pedicelli 8-10 mm. longi, crassi ; bracteae parvae, ovatae, circa 1 mm. longae. *Sepala* ovata vel deltoidea, basi breviter sed manifeste coalita, eglandulosa vel paucipunctata, 2 mm. longa, 1-1.5 mm. lata, apice rotundata, extra puberula, haud ciliata. *Petala* punicea (ex *Kerr*) basi breviter connata, ovata, apice subacuta, 6 mm. longa, 3-3.5 mm. lata, glabra, sparse punctata. *Stamina* corollae subaequalia, antheris acuminatis dorso paucipunctatis, filamentis brevissime sed manifeste affixis. *Ovarium* ovoideum 1 mm. diametro, glabrum ; stylus 4 mm. longus. *Bacca* rubra (ex *Kerr*) globosa, 1 cm. diametro.

Ranawng, Kao Pawta Luang Kêo, c. 200-600 m., evergreen forest, *Kerr* 16891.

***Ardisia undulato-dentata* Fletcher** [Myrsinaceae—Eumyrsineae] ; *A. japonicae* (Thunb). Blume affinis sed foliis undulato-dentatis antheris haud acuminatis differt ; nec non *A. chinensi* Benth. affinis sed petalis glandulosis differt.

*Frutex* parvus ; ramuli obtuse quadrangulares, primo manifeste ferrugineo-puberuli mox glabri, brunnei vel griseo-brunnei. *Folia*

elliptica, apice obtusa vel subacuta, basi cuneata, 5–10 cm. longa, 1·5–3 cm. lata, chartacea, supra viridia vel griseo-viridia, glabra, subtus brunnea vel griseo-brunnea, lepidibus parvis ferrugineis laxè consita, manifeste rubro-punctata, costa supra impressa subtus prominente, nervis lateralibus 10–12-paribus utrinque prominulis parallelis intra marginem arcuatim junctis, margine undulato-dentata, leviter recurva, petiolo 5–10 mm. longo supra canaliculato primo ferrugineo-puberulo mox glabro suffulta. *Inflorescentiae* axillares, ex umbellis 2–3 pauperrime paniculatae, minute furfuraceae pedunculo ad 5 mm. longo, pedicellis 5–8 mm. longis. *Calycis* lobi deltoidei, 1 mm. longi 0·75 mm. lati, extra furfuracei, ciliolati, rubro-glandulosi. *Corollae* tubus brevis; lobi ovati, attenuati, acuti, 2·5 mm. longi, 2 mm. lati, glabri, glandulis rubris praediti. *Stamina* petalis breviora 2 mm. longa, antheris acutis. *Ovarium* ovoideum 0·75 mm. diametro; stylus 4 mm. longus.

Langsuan, Tako, *Put* 1631.

**Chilocarpus cuneifolius** *Kerr* (Apocynaceae-Carisseae); *C. costato* Miq. affinis, sed ramulis foliisque tenuioribus, floribus minoribus differt.

*Frutex* scandens, glaberrimus, inflorescentia minute puberula excepta, ramulis novellis leviter compressis, mox teretibus. *Folia* obovata vel oblanceolata, apice breviter obtuse acuminata, basi longè cuneata, ad 10·5 cm. longa, 4 cm. lata, chartacea, margine leviter revoluta, costa subtus prominente, supra subimpressa, nervis lateralibus utrinque 15–20, patulis, parallelis, cum nervo marginali conjunctis, subtus subprominentibus, supra minus conspicuis, nervulis intermediis e nervo marginali decurrentibus, pagina subtus minute punctata; petiolus c. 1 cm. longus, leviter rugosus, supra canaliculatus. *Inflorescentia* terminalis ad 6 cm. longa, omnino minute puberula, multiflora, floribus in ramulos ultimos subumbellatim confertis, ramis pedicellisque sulcatis, bracteis ovato-triangularibus c. 1·5 mm. longis haud imbricatis, pedicellis 1–2 mm. longis. *Alabaster* maturus c. 10 mm. longus. *Sepalae* ovatae, obtusae, margine ciliatae, c. 1 mm. longae. *Corollae* tubus 5 mm. longus, subangulatus, medio leviter inflatus, intus infra staminum insertionem pilis deflexis indutus, fauce breviter puberulus; lobi falcati, 6 mm. longi, 2·5 mm. lati. *Stamina* subsessilia, antheris oblongis, basi obtusis, 1 mm. longis. *Ovarium* cum stylo 4 mm. longum, glabrum.

Nakawn Sritamarat, Prubua, c. 50 m., *Vanpruk* 705.

The type specimen described above consists of a single rather short shoot. A fruiting specimen from the Singapore Herbarium, *Haniff et Nur* 3931 from Krasom, which seems to be conspecific, has leaves up to 14 cm. long and 5·5 cm. broad, and an ovoid, somewhat pointed fruit, 5 cm. long and 3 cm. broad.

**Melodinus crassipetalus** *Kerr* (Apocynaceae-Carisseae); ab affini *M. cochinchinensi* (Lour.) Merrill floribus majoribus, corollae tubo intus dense villosa recedit.



*Frutex* scandens, ramulis novellis minute pubescentibus leviter compressis, mox teretibus, striatis. *Folia* oblonga vel ovato-oblonga, coriacea, apice obtusa, basi rotundata vel cuneata, margine leviter revoluta, sicco supra nigro-brunnea subtus pallidiora, costa basin versus supra subtusque minute pubescente, aliter glabra, costa subtus prominente supra impressa, nervis lateralibus utrinque 10–14, patulis, subtus prominentibus supra prominulis, rete nervorum subtus distincto supra obscuro, petiolo minute pubescente, rugoso, 5–6 mm. longo, suffulta. *Inflorescentia* cymosa terminalis, dense multiflora, minute pubescens, c. 5 cm. longa, 7 cm. lata, ramis sulcatis, bracteis ovatis, obtusis, 2 mm. longis, 2 mm. latis, pedicellis sulcatis, 4–6 mm. longis, bracteolis binis munitis. *Calyx* 5-partitus, pubescens, lobis tribus exterioribus late ovatis, obtusis, 3 mm. longis, 2.75 mm. latis, lobis interioribus oblongo-ovatis, 3 mm. longis, 1.9 mm. latis. *Corolla* alba, extus minute pubescens, tubo 7 mm. longo, basin versus leviter contracto, intus supra staminum insertionem dense villosa, deorsum pubescente, fauce squamis 5 parvis, bilobis vel bipartitis munito, lobis crassis, triangulari-ovatis, basi dextro auriculatis, c. 4 mm. longis. *Stamina* antheris c. 1.5 mm. longis, filamentis 0.5 mm. longis, supra medium tubi affixis. *Ovarium* cum stylo 4.5 mm. longum, glabrum. *Fructus* globosus, 4.5 cm. diametro, pericarpio lignoso. *Semina* ovoidea, c. 8 mm. longa, 5 mm. lata, testa ossea, cerebriformi.

Kaw Tao, c. 300 m., in evergreen forest, *Kerr* 12756.

***Rauwolfia membranifolia* Kerr** (Apocynaceae-Plumerieae) ; species *R. peguanae* Hook. f. atque *R. microcarpae* Hook. f. affinis, foliis tenuioribus fructu basi late rotundato differt.

*Frutex* c. 1 m. altus, glaber, ramulis primo leviter compressis laevigatis, mox teretibus leviter striatis lenticellis sparse instructis. *Folia* ternata, interdum opposita, elliptica vel obovata, apice abrupte acuteque acuminata, basi cuneata, 5–11 cm. longa, 2–4 cm. lata, tenuiter membranacea, sicco supra viridi-brunnea, subtus pallidiora, costa supra impressa subtus prominente, nervis lateralibus utrinque 8–12, supra inconspicuis, subtus prominulis, sensim arcuatis, marginem versus evanidis ; petiolus 2–4 mm. longus, basi glandulis vermiformibus praeditus. *Inflorescentia* axillaris, cymosa, pedunculata, 4–8-flora ; pedunculus 6–12 mm. longus, glandulis minutis resiniferis obtectus ; bractee lineares, acutae, c. 1 mm. longae ; pedicelli c. 6 mm. longi. *Calyx* 5-partitus ; lobi acute deltoidei, 1.5 mm. longi, margine basin versus 2–4 glandulis capitatis ornati ; tubus c. 0.5 mm. longus. *Corolla* non visa. *Discus* tenuis annularis, leviter lobatus, c. 0.3 mm. altus. *Carpella* distincta, apice rotundata. *Drupa* oblique obpyriformis, basi late rotundata, endocarpio valde rugoso, c. 0.5 mm. alta.

Prachuap, c. 100 m., in dry evergreen forest, *Kerr* 21580

***Alyxia nitens* Kerr** (Apocynaceae-Plumerieae) ; *A. odoratae* Wall. et *A. Reinwardtii* Bl. affinis, ab illa fructu multo minore ab hac foliis nitidis fructus exocarpio pulposo differt.

*Frutex* scandens, inflorescentia excepta glaber. *Ramuli* hornotini subquadrangulares; ramuli annotini teretes, longitudinaliter rugosi, paucilenticellati, lenticellis prominulis. *Folia* ternata, elliptica, apice breviter obtuseque acuminata, basi cuneata, margine leviter revoluta, 6-7.5 cm. longa, 2.8-3.2 cm. lata, coriacea, sicco supra brunnea nitidissima, infra pallidiora opaca, costa valida, supra canaliculata, infra prominente, nervis lateralibus tenuibus utrinque 18-22, parallelis rectis patentibus, nervo marginali inconspicuo a margine 0.5 mm. distante conjunctis, supra inconspicuis, infra subprominulis; petiolus 5-6 mm. longus, supra alte canaliculatus, basi glandulis linearibus axillaribus minutis praeditus. *Cymae* axillares, breviter griseo-puberulae, 6-8-florae, 12-16 mm. longae, pedunculis 5-7 mm. longis inclusis, bracteis linearibus ad 2 mm. longis, pedicellis 1.5-2 mm. longis. *Calyx* 5-partitus, tubo perbrevis, lobis anguste ovatis 1.5 mm. longis. *Corollae* tubus 6-7 mm. longus, ad staminum insertionem leviter expansus, fauce contractus, intus infra staminum insertionem pilorum alborum zona praeditus; lobi c. 2 mm. longi. *Stamina* sub apice tubi inclusa, filamentis 0.5 mm. longis, antheris 1 mm. longis. *Discus* tenuis obscure lobatus, margine pilis albis dimidium carpellorum haud excedentibus praeditus. *Ovarium* c. 1 mm. altum; stylus 2 mm. longus; stigma obpyriformis. *Drupa* ovoidae, atro-purpurea, 8 mm. longa, 6 mm. diametro, exocarpio tenuiter pulposo, endocarpio cartilagineo, pedicello 3 mm. longo suffulta.

Trang, Silkao, near sea-level, climbing in scrub, *Kerr* 19005.

***Kopsia angustipetala* Kerr** (Apocynaceae-Plumerieae); species *K. jasminiflorae* Pitard affinis, sed floribus multo minoribus differt.

*Frutex* c. 5 m. altus; ramuli primo breviter cinereo-pubescentes, mox glabri, valde sulcati. *Folia* oblongo-lanceolata vel elliptica, apice longe acuminata basi cuneata, 4.5-12 cm. longa, 1.2-4 cm. lata, rigide chartacea glabra, costa supra impressa subtus prominente, nervis lateralibus utrinque 10-16, supra inconspicuis, subtus prominentibus fere ad marginem arcuatis, rete nervulorum subtus subconspicuo, margine integra recurva; petiolus 2-4 mm. longus, glaber canaliculatus, basi glandulis papillatis praeditus. *Inflorescentia* terminalis cymosa, cymis umbelliformiter confertis, pedunculata, pedunculo 0.5-7 cm. longo, cum bracteis calycibusque pubescente; bractee ovatae acuminatae subacutae usque ad 5.5 mm. longae, 2.5 mm. latae, sursum versus deminutae. *Calyx* 5-partitus; tubus perbrevis; lobi ovato-oblongi subacuti, 4 mm. longi, 1.5 mm. lati, extra intusque breviter pubescentes. *Corolla* hypocraterimorpha, alba; tubus 15 mm. longus, gracilis, apice inflatus, extra glaber intus infra insertionem staminum annulo pilorum alborum instructus, fauce villosus; lobi ovato-lineares, leviter falcati, acuti, 8 mm. longi, 1.5 mm. lati. *Stamina* in parte inflata tubi inserta; filamenta 3 mm. longa; antherae emucronatae, 1 mm. longae. *Disci* ligulae binae cum carpellis alternantes, c. 1.25 mm. longae. *Carpella* ovata, 0.75 mm.

alta, superne pilosa, 2-ovulata; stylus 11 mm. longus; stigma cylindraceum, 0.75 mm. altum. *Fructus* ignotus.

Nawngkai, Chaiyaburi, c. 200 m., *Kerr* 21325.

***Alstonia rupestris* Kerr** (Apocynaceae-Plumerieae); *A. neriifoliae* D. Don affinis, floribus multo minoribus corollae tubo pro rata brevior inter alia facile distinguenda.

*Frutex* omnino glaber, c. 4 m. altus; ramuli striati, lenticellis ovatis vel subrotundis copiose instructi. *Folia* 3-5-natim, saepius 4-natim, verticillata, sessilia, lanceolata, apice acuta vel acute subacuminata, basi sensim attenuata, interdum leviter auriculata, margine integra revoluta, 6-10 cm. longa, 1-1.7 cm. lata, coriacea, sicco supra nigro-brunnea, subtus pallidiora, nervis lateralibus rectis vel leviter arcuatis, crebre parallelis, cum nervo intramarginali subtus conspicuis, supra subconspicuis; glandulae axillares minutae subulatae. *Cymae* terminales verticillatim dispositae, pedunculatae, pedunculis 1.5-2.5 cm. longis; bractee triangulares c. 1 mm. longae. *Flores* apice pedunculorum umbellatim dispositi, pedicellati, pedicellis 3-5 mm. longis. *Calyx* glaber eglandulosus, lobis triangularibus, obtusis, 1 mm. longis. *Corollae* tubus 7 mm. longus, superne sensim dilatatus, extra glaber, intus infra staminum insertionem cinctu pilorum ornatus, fauce pilosus; lobi oblongi, in alabastro sinistrorsum obtegentes, apice rotundati, 3 mm. longi, 1.75 mm. lati. *Stamina* prope apicem tubi inclusa; antherae 1 mm. longae, apiculatae, filamentis 1 mm. longis suffultae. *Discus* anguste annularis, lobis ligulatis binis, carpellis alternis. *Ovarii* carpella distincta, 1 mm. alta, glabra; stylus 4 mm longus; stigma subcylindraceum, apice apiculatum. *Fructus* folliculi bini, 5-7 cm. longi, sessiles, laeves, apice in rostrum c. 5 mm. longum attenuati. *Semina* oblonga compressa, c. 10 mm. longa, 2.5 mm. lata, margine leviter erosa praecipue basin versus, ciliata, ciliis brunneis apice basique elongatis.

Doi Chiangdao, c. 1800 m., on limestone rocks in open evergreen forest, *Kerr* 5560 (*type*), *Put* 366.

The description of the fruit and seeds has been drawn up from *Put* 366.

***Pagiantha peninsularis* Kerr** (Apocynaceae-Plumerieae); *P. corymbosae* (Roxb). Markgraf affinis, a qua floribus majoribus, inflorescentia pauciflora, inter alia, differt.

*Arbor* c. 12 m. alta, glaber, ramulis hornotinis compressis minute punctatis. *Folia* opposita, saepius imparia, oblongo-lanceolata vel lanceolata, apice longe obtuseque acuminata basi cuneata interdum leviter inaequilateralia, margine integra leviter recurva, 11.5-35 cm. longa, 3.8-11 cm. lata, subcoriacea, sicco supra viridi-brunnea, subtus pallidiora et minute lepidota, costa nervisque lateralibus subtus prominentibus, supra impressis, nervis lateralibus utrinque 10-14, subparallelis fere rectis, prope marginem sensim arcuatis mox evanidis, rete nervulorum obscuro, petiolo 1.3-3 cm. longo, supra canaliculato, ad axillam ligula brevi ornato, suffulta. *Inflorescentia* axillaris,



dichotoma, 3-7-flora, pedunculo communi perbrevis vel subnullo suffulta, pedunculis secundariis 1.3-3 cm. longis, bracteis minutis. *Calyx* 5-lobatus, 4.25 mm. altus, lobis obtusis margine ciliatis, coriaceis, 2.5 mm. longis, 2.5 mm. latis, intus glandulis obpyriformibus in quinque fasciculos e fundo tubi usque paulo supra basim loborum extendentes conglomeratis instructus. *Alabaster* loborum corollae rotundatus, lobis sinistrorsum obtegentibus. *Corolla* hypocrateriformis, alba, satis crassa; tubus 18 mm. longus, extra intusque glaber; lobi leviter sigmoidei, apice rotundati, basi margine obtegente leviter auriculati, margine obtecto basim versus bene undulato, 17 mm. longi, 5.5 mm. lati, supra minute pubescentes. *Stamina* prope faucem inserta; antherae 2 mm. longae, breviter mucronatae, thecis deorsum leviter divergentibus, theca externa basi paulo incurva, filamentis c. 2 mm. longis suffultae. *Discus* 0. *Carpella* distincta, 5 mm. alta, 2.5 mm. lata, apice rotundata, ovulis numerosis, 7-8-seriatis; stylus 10 mm. longus, infra glaber, sursum leviter incrassatus et minute pubescens; stigma subglobosum, stylo paulo crassius, apiculatum, apiculo papilloso. *Fructus* ignotus.

Ranawng, Kao Pawta Luang Keo, c. 500 m., evergreen forest, Kerr 16991.

This species is also represented by *Parkinson* 2052, collected on Victoria Island, South Tenasserim, some 50-60 kilometres north of the type locality.

**Globba (Marantella) Garrettii** Kerr (Zingiberaceae); *G. reflexae* Craib affinis, a qua foliis latioribus inflorescentia pilosiore distinguitur.

*Herba* erecta 1.2 m. alta (ex *Garrett*) caespitosa. *Folia* oblongo-lanceolata, apice caudato-acuminata, basi inaequaliter cuneata, interdum uno latere rotundata, 12-18 cm. longa, 4-5 cm. lata, brevissime petiolata, subtus molliter breviterque pubescentia, supra tenuiter pilosa; vaginae 6-7, ciliatae; ligulae brevissimae pilosae. *Inflorescentia* ad 9 cm. longa, basi genueflexa, ramis pilosis 8-15 inter se satis approximatis subpatulis; bractee virides reflexae ovato-oblongae vel obovato-oblongae, apice breviter acuminatae interdum fere rotundatae, infimae ad 17 mm. longae 6 mm. latae, superiores sensim minores; bulbilli minuti, obpyriformes, hirsuti c. 1.5 mm. longi. *Calyx* ut corolla staminodiaque glaber et minute glanduloso-punctatus, 4 mm. longus, breviter 3-lobatus, lobis majoribus duobus obtusis. *Corolla* lutea (ex *Garrett*); tubus 20 mm. longus; lobi 5 mm. longi. *Staminodia* lateralialia 7 mm. longa, elliptico-falcata obtusa. *Labellum* 13 mm longum, bilobatum, lobis obtusiusculis c. 2 mm. longis. *Filamentum* 20 mm. longum; anthera 2.5 mm. longa, latere utroque alis duobus acutis interdum dente intermedio ornata, lobo superiore c. 3 mm. longo, 1 mm. lato, margine superiore unidentato, lobo inferiore parum minore. *Ovarium* parum verruculosum, 1.5 mm. altum.

Doi Chiengdao, c. 540 m., *Garrett* 983.



PLATE I

*Kew Bulletin*, 1937]



Dried material of *S. maritima* from Pen-y-fan, Brecknock Beacons, to show habit.

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IV—RESEARCHES ON *SILENE MARITIMA* AND *S. VULGARIS*:—XVII\*. E. M. MARSDEN-JONES AND W. B. TURRILL.  
GENETICAL INVESTIGATION OF A WELSH MOUNTAIN PLANT.

In July 1927 we received from C. V. B. Marquand a living plant of *Silene* collected on Pen-y-fan, one of the Brecknock Beacons, South Wales, at an altitude of 870 m. This plant being grown at Potterne remained constant to a peculiar tufted habit of growth and distinctive foliage characters. On the basis of its floral and fruit characters and its winter behaviour the plant had to be classified as *S. maritima*. Its coronal development was peculiar and the seeds were strongly tubercled. This plant was selfed and bred true to most of the distinctive characters. It segregated only for the following of all the characters investigated: corona, anthocyanin blotch, petal lobing, sex, filament colour, and stigmata colour.

The plant itself (A. 21) was crossed with *S. maritima* and *S. vulgaris* and the  $F_1$  and  $F_2$  families are analyzed in this paper and the results discussed. A description of the stock plant A.21 is given below. Descriptions of the other stock plants will be found as follows: A. 1 in K.B. 1928, 4 and B. 11 in K.B. 1931, 121.

The following crosses and selfings are recorded.

- N. 46 = A. 21 selfed
- N. 47 = A. 2  $\times$  A. 21
- N. 80 = N. 47 plant 2 selfed
- N. 49 = B. 11  $\times$  A. 21
- N. 95 = N. 49 plant 18 selfed
- N. 96 = N. 49 plant 33 selfed
- N. 97 = N. 49 plant 25 selfed

A. 21. Brecknock Beacons, 15 July 1927, communicated by C. V. B. Marquand.

*Habit*: tufted very compactly, stems semi-prostrate up to 5 dm. long; little anthocyanin in vegetative parts; barren shoots persistent.

*Indumentum*: glabrous.

*Leaves*: narrowly oblanceolate to very narrowly elliptic, 5.6 cm. long, 1 cm. broad, ciliate, fleshy, green.

*Inflorescence*: of 3 to 4 flowers; flowers actinomorphic; bracts glabrous.

*Calyx*: much inflated, 2.0 cm. long, 1.2 cm. diameter in flower, enlarging considerably in fruit, with much anthocyanin.

*Corolla*: with the petals and segments not overlapping; diameter 2.7 cm. Petals 2.3 cm long, 1.2 cm. broad, lamina bilobed divided  $\frac{2}{3}$  its length, no full scales but on different petals, even in the same flower, ranging from small scale to boss, with anthocyanin blotch.

*Androecium*: fully developed, flowers hermaphrodite. Filaments purple; anthers purple.

*Gynoecium*: with white stigmata and purple immature seeds.

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\* Continued from K.B. 1936, 459.

*Ripe capsules* : obloid, without the teeth 6 mm. long, 9 mm. broad, mouth 6 mm. in diameter ; teeth each an isosceles triangle, 4 mm. long, 2 mm. broad, strongly reflexed ; carpophore 3 mm. long, 2 mm. broad. The capsules are of an exaggerated *maritima* type.

*Mature seeds* : strongly tubercled.

N. 46 = A. 21 selfed. 63 plants in the family.

*Habit* : as immediate parents, stems up to 3 dm. long.

*Indumentum* : glabrous.

*Leaves* : as immediate parent.

*Inflorescence* : of 1 to 7 flowers ; flowers actinomorphic.

*Calyx* : as immediate parent.

*Corolla* : with petals and segments not overlapping, lamina divided  $\frac{2}{3}$  its length ; 35 small scale : 17 boss : 6 small scale to boss ; 17 with anthocyanin blotch : 43 without anthocyanin blotch ; 9 multilobed : the remainder bilobed.

*Androecium* : 43 hermaphrodite only : 8 female only : 8 hermaphrodite and female. Filaments 42 purple : 9 white ; anthers all purple.

*Gynoecium* : 22 with white stigmata : 37 with purple stigmata ; all with purple immature seeds.

*Ripe capsules* : 36 (all that produced fruits) as immediate parent.

*Mature seeds* : 36 (all that produced seeds) strongly tubercled.

N. 47 = A. 2  $\times$  A. 21. 52 plants in the family.

*Habit* : semi-prostrate and rather compact, with stems up to 5 dm. long ; medium amount of anthocyanin in stems, barren overwintering shoots present in all plants.

*Indumentum* : glabrous.

*Leaves* : oblanceolate to narrowly oblong, average of well developed leaves 3.7 cm. long, 0.8 cm. broad.

*Inflorescence* : of 3 to 7 flowers ; flowers actinomorphic.

*Calyx* : all broadly ellipsoid ; with much anthocyanin.

*Corolla* : with petals and segments contiguous or overlapping ; lamina lobed  $\frac{3}{4}$  its length ; 38 small scale : 14 full scale ; 18 with anthocyanin blotch : 33 no anthocyanin blotch ; 4 multilobed : 48 bilobed.

*Androecium* : 27 with hermaphrodite flowers only : 7 with hermaphrodite and female flowers : 18 with female flowers only ; anthers all purple ; filaments 30 purple : 3 white.

*Gynoecium* : 27 with white stigmata : 25 with purple stigmata ; immature seeds all purple.

*Ripe capsules* : all of *maritima* type, 15 as A. 21 : 37 an open mouthed type.

*Mature seeds* : all tubercled.

N. 80 = N. 47 plant 2 selfed. 108 plants in the family.

N. 80 plant 2 had small scales, anthocyanin blotch, no multilobing, fully hermaphrodite flowers, purple filaments, purple stigmata, *maritima* (A. 21) capsule.

PLATE II

[Kew Bulletin, 1937]

*Silene maritima*, Stock Plant A21,2. Pen-y-fan, Brecknock, alt. 2900'. 1927



Specimens of *S. maritima* from Pen-y-fan, Brecknock Beacons, to show details of foliage and flower characters.

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PLATE III

*Kew Bulletin*, 1937]

N  
47

F<sub>1</sub> *Silene maritima* Stock Plant A.2 X *S. maritima* Stock Plant A.21 Plant



Specimens of N.47 (A.2 X A.21) to show details of foliage and flower characters.

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*Habit* : 104 semi-prostrate and rather compact : 2 very compact and tufted as A. 21 : 2 as A. 2 ; with stems up to 4.4 dm. long ; medium anthocyanin in vegetative parts ; barren overwintering shoots present in all plants.

*Indumentum* : glabrous.

*Leaves* : 2 plants segregated for A. 2 leaf type, 106 were intermediate between A. 2 and A. 21 types but with a bias towards A. 2 ; no A. 21 type appeared.

*Inflorescence* : of 1 to 3 flowers ; flowers actinomorphic.

*Calyx* : 101 as A.2 : 7 as A.21 ; all with much anthocyanin.

*Corolla* : 87 with petals overlapping or contiguous : 21 with petals not overlapping or contiguous ; 59 with segments overlapping or contiguous : 49 with segments not overlapping or contiguous ; 96 lamina lobed  $\frac{3}{4}$  its length : 12 lamina lobed  $\frac{2}{3}$  its length ; 2 scale : 96 small scale : 2 boss : 2 small scale to scale : 6 small scale to boss ; 79 with anthocyanin blotch : 29 no anthocyanin blotch ; 7 multi-lobed : 101 bilobed.

*Androecium* : 63 with hermaphrodite flowers only : 22 with hermaphrodite and female flowers : 23 with female flowers only ; anthers 85 purple ; filaments 69 purple : 16 white.

*Gynoecium* : 95 white stigmata : 13 purple stigmata ; immature seeds all purple.

*Ripe capsules* : all of *maritima* type and general shape, with reflexing teeth, no capsules approximating to *vulgaris* type appeared. 28 were scored as similar to A.21 (a *super-maritima* in fruit characters) and 69 as similar to A.2, but this scoring is of doubtful value since the differences are of small degree and fluctuations occur on the same plant. 11 were unscorable for ripe capsules.

*Mature seeds* : strongly tubercled 23 : tubercled 51 : armadillo 23 : not scorable 11.

**N. 49 = B.11  $\times$  A.21.** 23 plants in the family.

*Habit* : ascending more or less compact, with stems up to 6 dm. long, with a trace of anthocyanin, intermediate for barren stems.

*Indumentum* : medium for all plants.

*Leaves* : oblanceolate to linear-elliptic (average well formed), 3.6 cm. long, 1.2 cm. broad.

*Inflorescence* : of 7 to 12 flowers ; slightly zygomorphic.

*Calyx* : inflated, with a medium amount of anthocyanin.

*Corolla* : with the petals and segments not overlapping ; petals with lamina bilobed,  $\frac{3}{4}$  lobed, all with bosses, with no anthocyanin blotch.

*Androecium* : 4 hermaphrodite and female : 29 female only. Filaments 4 purple ; anthers 4 purple.

*Gynoecium* : 5 with white stigmata : 28 with purple stigmata ; all with purple immature seeds.

*Ripe capsules* : all of  $F_1$  type (K.B. 1928, p. 2, fig. 8).

*Mature seeds* : 5 strongly tubercled : 23 tubercled.

**N. 95** = N.49 plant 18 selfed. 32 plants in the family.

N.49 plant 18 was female and hermaphrodite with purple stigmata and tubercled seeds.

*Habit*: 8 spreading: 24 compact; 0 semi-prostrate: 32 ascending; stems from 1.5 dm. to 6.0 dm. long; 16 intermediate for barren stems: 16 barren stems absent.

*Indumentum*: 0 dense: 6 medium: 15 few: 11 glabrous.

*Anthocyanin in vegetative parts*: 8 much: 18 medium: 6 little.

*Leaves*: 0 M: 13 HM: 3 MH: 11 H: 2 VH: 3 HV: 0 V.

*Inflorescence*: of from 7 to 50 flowers.

Number of flrs.        7   15   16   20   21   24   25   27   30   35   50

Number of plants    3   13   2   3   3   2   1   2   1   1   1

Flowers all zygomorphic and nodding, even if only slightly.

*Calyx*: 22 medium anthocyanin: 9 little anthocyanin; 3 inflated: 25 subinflated: 4 as A.21.

*Petals*: all white; all bilobed; 17 lobed  $\frac{3}{4}$ : 13 lobed  $\frac{2}{3}$ : 1 lobed  $\frac{1}{2}$ ; 1 blotch present: 30 blotch absent; petals 8 contiguous or overlapping: 23 not contiguous or overlapping; segments 1 overlapping: 30 not contiguous or overlapping; 2 plants small scales: 29 bosses.

*Androecium*: anthers 7 purple; filaments 6 purple: 1 white.

*Sex*: 4 with hermaphrodite flowers only: 4 with hermaphrodite and female flowers: 23 with female flowers only.

*Gynoecium*: 26 with purple stigmata: 5 with white stigmata; 27 immature seeds purple: 5 white.

*Mature capsules*: *maritima* (A.21) shape 6: *vulgaris* (B.11) shape 5: intermediate 15: unscorable 5; teeth reflexing 4: teeth spreading 22. All the capsules with teeth reflexing were of the *maritima* (A.21) shape, but one with *maritima* (A.21) shape had the teeth spreading.

*Mature seeds*: strongly tubercled 1: tubercled 25: unscorable 6.

**N. 96** = N.49 plant 33 selfed. 18 plants in the family.

N.49 plant 33 was hermaphrodite and female with purple stigmata and tubercled seeds.

*Habit*: 5 spreading: 13 compact; 2 semi-prostrate: 16 ascending; stems from 1.8 dm. to 5.6 dm. long; all intermediate for barren stems.

*Indumentum*: 4 medium: 6 few: 8 glabrous.

*Anthocyanin in vegetative parts*: 1 much: 17 medium.

*Leaves*: 2 M: 12 HM: 3 MH: 1 H.

*Inflorescence*: of from 7 to 27 flowers.

Number of flowers:    7   8   9   12   13   15   19   25   27

Number of plants:    7   1   1   1   2   2   2   1   1

Flowers all zygomorphic and nodding, even if only slightly.

*Calyx*: 1 much anthocyanin: 15 medium anthocyanin: 2 little anthocyanin; 7 subinflated: 1 narrow: 10 as A.21.

*Petals*: all white; 11 bilobed: 7 multilobed; 9 lobed  $\frac{3}{4}$ : 9 lobed  $\frac{2}{3}$ ; 2 blotch present: 16 blotch absent; petals 1 overlapping:

17 not overlapping or contiguous ; segments all not overlapping or contiguous ; 2 small scales : 16 bosses.

*Androecium* : anthers 7 purple ; filaments 7 purple.

*Sex* : female flowers × hermaphrodite (on the same plant) gave 3 with hermaphrodite and female flowers : 4 with female flowers only. Hermaphrodite flowers selfed gave 4 with hermaphrodite flowers only : 7 with female flowers only.

*Gynoecium* : 13 with purple stigmata : 5 with white stigmata ; 16 immature seeds purple : 2 white.

*Mature capsules* : *maritima* (A.21) shape 6 : *vulgaris* (B.11) shape 2 : intermediate 8 : unscorable 5 ; teeth reflexing 6 ; teeth spreading 10. All the capsules with teeth reflexing were of the *maritima* (A.21) shape and all with *maritima* (A.21) shape had reflexing teeth ; one of *vulgaris* shape had the teeth very slightly spreading.

*Mature seeds* : strongly tubercled 8 : tubercled 8 : unscorable 2.

N.97 = N.49 plant 25 selfed. 33 plants in the family.

N.49 plant 25 was female and hermaphrodite with purple stigmata and tubercled seeds.

*Habit* : 5 spreading : 28 compact ; 4 semi-prostrate : 29 ascending stems from 1.2 dm. to 5.5 dm. long ; all plants with very few green mostly lateral over-wintering barren shoots.

*Indumentum* : 8 dense : 7 medium : 5 few : 13 glabrous.

*Anthocyanin in vegetative parts* : 6 much : 26 medium : 1 little.

*Leaves* : 2 M : 15 HM : 3 MH : 13 H.

*Inflorescence* : of from 7 to 26 flowers.

Number of flowers : 7 15 18 19 20 23 26

Number of plants : 13 13 1 1 1 1 1

Flowers all zygomorphic and nodding, even if only slightly.

*Calyx* : 26 medium anthocyanin : 4 little anthocyanin : 1 no anthocyanin ; 2 inflated : 26 subinflated : 2 as A. 21 : 1 narrow.

*Petals* : all white ; all bilobed ; 15 lobed  $\frac{3}{4}$  : 12 lobed  $\frac{2}{3}$  : 2 lobed  $\frac{1}{2}$  ; none with anthocyanin blotch ; 1 petals overlapping : 29 petals not contiguous or overlapping ; 3 segments overlapping : 27 not contiguous or overlapping : all with bosses. Two plants had " poor petals ".

*Androecium* : anthers 5 purple ; filaments 4 purple : 1 white.

*Sex* : 4 with hermaphrodite flowers only : 1 with hermaphrodite and female flowers : 26 female flowers only.

*Gynoecium* : 26 with purple stigmata : 6 with white stigmata ; 27 immature seeds purple : 3 immature seeds white.

*Mature capsules* : *maritima* (A.21) shape 6 : *vulgaris* (B.11) shape 4 : intermediate 6 : unscorable 17 ; teeth reflexing 6 : teeth spreading 8 : teeth erect 2. One plant with *maritima* (A.21) capsule shape had the teeth spreading, the other 5 had the teeth reflexed ; one plant with intermediate capsule shape had the teeth reflexing ; two plants with *vulgaris* shaped capsules had the teeth erect, the other two had them very slightly spreading.



*Mature seeds* : strongly tubercled 3 : tubercled 10 : unscorable 20.

# DISCUSSION

The characters investigated may be considered in sequence.

*Habit* : The  $F_1$  between the mountain plant (A.21) and the A.2 *S. maritima* was approximately intermediate and the  $F_2$  showed segregation, but with only two plants of A.2 type and two of A.21 type segregating, 104 being approximately as the  $F_1$  plants. This is approximately what was expected since several factors are involved in giving the phenotypic expression termed habit. Anthocyanin was present in the vegetative parts in all the families and ranged from little to medium. The  $F_1$  and  $F_2$ , like the original parents, retained green over-wintering barren shoots.

The cross between the mountain plant and *S. vulgaris* gave an approximately intermediate  $F_1$ , and segregated in  $F_2$  in such a manner as to suggest that 3 factor pairs are involved in producing the habit. The summated figures for the  $F_2$  families are—77 ascending : 65 compact : 18 spreading : 6 semi-prostrate. Little anthocyanin appeared in the vegetative parts of the parents and  $F_1$  while the  $F_2$  families segregated but showed most plants with a medium amount, in the ratio 15 much : 61 medium : 7 little. The  $F_1$  plants showed an intermediate condition for retention of green overwintering barren stems and  $F_2$  families showed little segregation for this character.

Maximum and minimum stem lengths are given for all families but stem length measurements were made for all plants only in the  $F_2$  families from the interspecific cross. These are tabulated below and the results are chiefly of importance for comparison with other published and unpublished results—a comparison which is to be made in a later paper of this series.

Family	11-20	21-30	31-40	41-50	51-60	Max- imum	Mini- mum	Mean	S.D. of mean
N.95	1	4	11	11	5	60	15	40	10.4
N.96	2	3	8	4	1	56	18	37	10.0
N.97	9	11	9	3	1	55	12	29	10.0
Totals	12	18	28	18	7	60	12	35	

Table of stem lengths, with a frequency table based on five classes with 10 cm. as the class range, and maximum, minimum, and mean in cm., and standard deviation of the mean for three  $F_2$  families from three  $F_1$  sibs.

*Indumentum* : N.47 and N.80 consisted only of glabrous plants from glabrous parents. The dense  $\times$  glabrous gave a medium  $F_2$

which segregated in the  $F_2$  families in the summated ratio 8 dense : 17 medium : 26 few : 32 glabrous. This is low on the dense and high on the glabrous side for the expected 1 : 2 : 1 ratio (adding medium and few together).

*Leaves* : Both  $F_1$ s gave approximately intermediate types. That involving A.2 segregated but gave only two plants of one (A.2) original parental type. That involving *S. vulgaris* segregated to give summated  $F_2$  figures as follows :

4 M : 40 HM : 9 MH : 25 H : 2 VH : 3 HV : 0 V.

The value given to M here is that of the mountain plant (A.21), i.e. M has not the same value as in previous papers.

*Inflorescence* : N.47 and N.80 had the low numbers of flowers (1 to 7) characteristic of *S. maritima*. N.49 had 7 to 12 flowers per inflorescence. The  $F_2$  families from this segregated giving the following summated results :

Number of flowers :	7	8	9	12	13	15	16	18	19	20	21
Number of plants :	23	1	1	1	2	28	2	1	3	4	3

Number of flowers :	23	24	25	26	27	30	35	50
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Number of plants :	1	2	2	1	3	1	1	1
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In the *S. maritima* crosses the flowers were all actinomorphic. In the *S. vulgaris*  $\times$  A.21,  $F_1$  and  $F_2$  families, all flowers were zygomorphic even if only slightly so, and no actinomorphic flowers segregated.

*Calyx* : In the *S. maritima* crosses the  $F_1$  had broadly ellipsoid calyces and  $F_2$  showed a small amount of segregation with a 15 to 1 ratio. When *S. vulgaris* was used as the ovule parent the  $F_1$  had inflated calyces and the  $F_2$  families gave complicated segregations possibly due to combinations of 3 factor pairs. Anthocyanin in calyx gave, in the  $F_2$  families from *S. vulgaris*  $\times$  A.21, a ratio of 79 with : 1 without, suggesting that 3 factors are involved in a cumulative manner.

*Corolla* : Overlapping of petals and of segments is dominant to not overlapping. The ratios in the cross involving two *S. maritima* plants probably indicate a 3 to 1 ratio for petals. In the cross between *S. vulgaris* and A.21 the occurrence of a few plants with contiguous petals or segments is probably to be explained by their being really not overlapping or contiguous genetically. None of them has both petals and segments contiguous or overlapping. The degree of zygomorphy apart from the size and spread of the petal lamina, modified the phenotypic expression.

$\frac{3}{4}$  lobing is dominant over  $\frac{2}{3}$  lobing and all  $F_2$  families show segregation with  $\frac{3}{4}$  lobed plants the more numerous (except that one small  $F_2$  family gave equal numbers).

Coronal development in  $F_2$  families is obviously very different from one family to another according to its development in the original ovule parent. A.21 did not breed true. Crossed with *S. maritima* with a good scale it segregated 14 scale : 38 small scale

and one of the latter selfed gave 2 scale : 104 small scale : 2 boss. Crossed with *S. vulgaris* with a boss it gave an  $F_1$  all with bosses and  $F_2$  families whose summated ratios were 4 small scales : 78 bosses. These figures probably indicate the influence of maternal cytoplasm.

All the original stock-plants used had bilobed petals. Segregation occurred in one  $F_1$  and two  $F_2$  families, but with small numbers of multilobed plants.

A.21 was heterozygous for petal blotch. Crossed with A.2 (see K.B. 1933, 361) it segregated in  $F_1$  (18 : 33) and in  $F_2$  (79 : 29). Crossed with *S. vulgaris*,  $F_1$  had no blotch and  $F_2$  threw 3 with blotch against 79 without. From the data at present available we are not sure of the nature of the several factors involved.

None of the original parents was homozygous hermaphrodite or homozygous female. One  $F_1$  and all the  $F_2$  families gave hermaphrodite, mixed, and female plants. One  $F_1$  family gave only mixed and female plants. The  $F_2$  families summate as follows :

From N.47	63 ♂ : 22 ♀ and ♀ : 23 ♀
From N.49	12 ♂ : 8 ♀ and ♀ : 60 ♀

The *Silene vulgaris* (B.11) used as the ovule parent to produce N.49 has a predominating female influence both in  $F_1$  and  $F_2$  families (see also our *Silene* paper XVI).

All plants had purple anthers and those used bred true for this character. The large proportion of female plants which appeared in  $F_1$  and  $F_2$  families make the figures for the segregating character of filament colour very small in N.49 and the  $F_2$  families derived from it. Probably 2 or 3 factor pairs are involved and these are at least partly cumulative in action.

A.21 was heterozygous for stigmata colour but bred true for immature seed colour. Crossed with *S. maritima* (A.2), the  $F_1$  and  $F_2$  families segregated for stigmata colour in ratios of 1 : 1 and 1 : 7 respectively but bred true to immature seed colour. A.21 crossed with *S. vulgaris* (B.11) segregated in the  $F_1$  and all  $F_2$  families for colour in stigmata and for  $F_2$  families for colour in immature seeds. The ratios range from 3 : 1 to 9 : 1. For colour in both stigmata and immature seeds several factors are needed.

*Mature capsules* : In the three  $F_2$  families derived from the interspecific cross the following results were obtained :

	<i>maritima</i> shape	intermediate	<i>vulgaris</i> shape
N.95	6	15	5
N.96	6	8	2
N.97	6	6	4
	<hr/> 18	<hr/> 29	<hr/> 11

Unfortunately, both fruits and seeds set very badly, especially in N.97. The figures probably represent a 1 : 2 : 1 ratio and this is in agreement with our previous results. There is a high correlation between *maritima* shape and reflexed teeth, *vulgaris* shape and erect teeth, and intermediate shape and spreading teeth. Occasion-





PLATE IV

*Kew Bulletin*, 1937]



Specimens of N.49 (B.11 × A.21) to show details of foliage and flower characters.

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ally, however, this real or apparent linkage breaks down. This matter is discussed with additional evidence in the next paper of this series.

*Mature seeds.* A.21 (mountain *maritima*) had strongly tubercled seeds and on selfing bred true to this character. Crossed with A.2 (sea-coast *maritima* with armadillo seeds) it gave a tubercled  $F_1$  and segregated in  $F_2$  in the ratio 23 strongly tubercled : 51 tubercled : 23 armadillo. When crossed with a tubercled *vulgaris*, 5 of the  $F_1$  plants were strongly tubercled and 23 tubercled and the  $F_2$  families from three  $F_1$  sibs segregated as follows :

	Strongly tubercled	Tubercled	Armadillo
N.95	1	25	0
N.96	8	8	0
N.97	3	10	0
	—	—	—
Totals	12	43	0

It is clear from the results published in this and previous papers that armadillo is recessive to both tubercled and strongly tubercled. Armadillo crossed strongly tubercled (both in *maritima*) gave 1 : 2 : 1 ratio in  $F_2$ . Of the 83 plants in the  $F_2$  families from the cross tubercled *vulgaris*  $\times$  strongly tubercled mountain *maritima*, 28 failed to produce mature seed. The majority of these were in N.97, in which family only 13 plants out of 33 produced scorable mature seeds. This sterility (whatever its cause) makes any interpretation of the above figures unsatisfactory. It is probable that the  $F_1$  sibs are not genetically equivalent for testa characters and that "strongly tubercled" and "tubercled" plants differ in cumulative genes. The constitution of B.11 as shown by selfing and other crosses is very imperfectly known (see Kew Bull. 1934, 383 seq.).

#### SUMMARY

The results are given of selfing a mountain plant from Wales and of crossing it with typical *Silene maritima* and *S. vulgaris*. In the majority of its characters the Welsh plant agreed with the generally accepted diagnostic characters of *S. maritima*. In several aberrant characters (foliage, corona, and calyx) previous contamination with *S. vulgaris* was suggested. Alternatively, the aberrant characters might represent more ancient phenotypic combinations than now usually found in coastal populations of *S. maritima*.

Analyses are given of the following characters and organs and their genetical behaviour : habit, indumentum, leaves, inflorescence, calyx, corolla (overlapping of petals and segments, depth of lobing, degree of lobing, corona, petal blotch), sex, filaments, anthers, stigmata, immature seeds, fruits, and mature seeds.

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## V—TROPICAL AFRICAN PLANTS: XV.\*

J. HUTCHINSON AND J. M. DALZIEL.

### EBENACEAE

**Diospyros longicaudata** *Gürke ex Hutch. et J. M. Dalz.* Fl. West Trop. Afr. 2, 4 (1931); species foliis longe caudato-acuminatis, calyce truncato distincta.

*Ramuli* teretes, glabri. *Folia* oblongo-elliptica, longe acuminata, basi breviter cuneata, 8–12 cm. longa, 3–3.5 cm. lata, acumine circiter 2 cm. longo, glabra, nervis lateralibus 3–4 infra prominentibus; petioli 5 mm. longi. *Flores* axillares, solitarii, sessiles. *Calyx* truncatus, coriaceus, glaber, sicco leviter corrugatus, 3 mm. longus. *Corolla* alabastro tantum visa, glabra, calyce duplo longior.

S. NIGERIA: Johann Albrechtshöhe, *Staudt* 943 (type). CAMEROONS: Bipinde, *Zenker* 3765.

**Diospyros insculpta** *Hutch. et J. M. Dalz.* op. cit. 4; species foliis late ellipticis nervis lateralibus 5-jugis supra impressis distincta.

*Ramuli* sicco purpurascentes, glabri. *Folia* late elliptica, basi late obtusa, apice breviter et latissime acuminata, 12–16 cm. longa, 6–7 cm. lata, glabra, nervis lateralibus utrinsecus 5–6 supra insculptis infra valde prominentibus inter nervos laxe reticulatis; petioli circiter 7 cm. longi, transverse rugosi. *Flores* axillares, glomerulati, subsessiles, sicco tantum visi, ovoidei. *Calyx* truncatus, 2.5 mm. longus, glaber. *Corolla* alabastro late ovoidea, subacuta, calyce duplo longior.

S. NIGERIA: Oban, *Talbot* 1609 (type).

**Diospyros liberiensis** *A. Chev.*† Expl. Bot. Afr. Occid. Franç. 396 (1920), nomen; ex Hutch. et J. M. Dalz. op. cit. 4; affinis *D. Mannii* Hiern, sed foliis ovatis vel ovato-ellipticis infra minute puberulis differt.

*Ramuli* sericeo-tomentelli, leviter flexuosi. *Folia* ovata vel ovato-elliptica, basi late rotundata, apice acute triangulari-acuminata, 9–13 cm. longa, 5–7 cm. lata, supra glabra, infra minute puberula, nervis lateralibus pilis leviter longioribus utrinsecus circiter 6 supra vix prominulis infra prominentibus, nervis tertiariis paucis arcuatis infra prominulis; petioli sericeo-pilosi, circiter 6 mm. longi. *Flores* masculi axillares, glomerati, breviter pedicellati. *Calyx* profunde 4-lobatus, sericeo-tomentosus, lobis triangulari-subulatis 2.5 mm. longis. *Corolla* alabastro oblongo-ovoidea, subacuta, circiter 6 mm. longa, extra appresse tomentella, matura non visa.

IVORY COAST: Lower Cavally river; Prolo, Aug., *Chevalier* 19857 (type).

**Diospyros Thomasii** *Hutch. et J. M. Dalz.* op. cit. 6; species aspectu *D. Barteri* Hiern, sed ramulis non pilosis et foliis non cordatis facile distinguitur.

*Arbor* usque ad 16 m. alta; ramuli floriferi molliter tomentelli. *Folia* oblonga ad late ovato-elliptica, basi rotundata, apice sensim

\* Continued from K.B. 1936, 489.

† The types of Chevalier's species are in the Paris Herbarium.

acuta, ad 14 cm. longa et 7 cm. lata, valde discoloria, supra glabra, atra, infra glauco-papillosa et plerumque praecipue in nervis parce setulosa; nervi laterales utrinsecus 3-5, tertiariis conspicuis et parallelis; petioli molliter tomentelli. *Flores* albi, axillares, glomerato-cymulosi, ubique tomentelli; bracteae parvae; calycis lobi late ovati, acuti, circiter 2 mm. longi, utrinque hirsutiusculi; corolla urceolato-cylindrica, basi contracta 8 mm. longa, extra adpresse tomentosa, lobis late subulatis brevibus recurvatis; stamina 10, filamentis pubescentibus, antheris 4 mm. longis apice subulato-apiculatis. *Flores* ♀ non visi. *Fructus* late ovoideo-globosus, usque ad 4 cm. diametro, molliter tomentellus, stylo persistente brevi apiculatus, endocarpio crustaceo circiter 2 mm. crasso; calyx persistens; semina 1.5 cm. longa, carnosa.

SIERRA LEONE: Bumbuna, Oct., *N. W. Thomas* 3293 (type); Pujehun, Feb. (fr.) *N. W. Thomas* 8437; York Pass, Mar., *Lane-Poole* 433; without loc., *Lane-Poole* 109. LIBERIA: Dukwia River, Monrovia, *Cooper* 129; 261; 378; Gbanga, Sept., *Linder* 481; Péahtah, Oct., *Linder* 895.

Described as a tree up to 50 ft. (*Lane-Poole*); according to *Cooper* the native name in Liberia is *Gueyh-Vine*, the wood is used for spring traps and the ripe berries are used for food; wood also used for boat-oars, and liquor obtained from the bark is used in the treatment of diarrhoea.

**Maba Cooperi** *Hutch. et J. M. Dalz. op. cit.* 7; affinis *M. Mannii* Hiern, sed foliis plus minusve oblongis, subabrupte et longe acuminatis minoribus, floribus breviter pedicellatis differt.

*Arbor* usque ad 12 m. alta; ramuli nigrescentes, parce puberuli. *Folia* plus minusve oblonga vel oblongo-elliptica, subabrupte et longe acuminata, basi oblique et inaequaliter cuneata, usque ad 10 cm. longa et 4.5 cm. lata, glabra, sed infra leviter pustulata, sicco atro-viridia; nervi laterales utrinsecus 5-6, infra valde prominentes, intra marginem furcati et conjuncti; petioli 3 mm. longi, minute setulosi. *Flores* ♂ tantum visi, plerumque in ramis vetustioribus dense fasciculati sed etiam floribus paucis axillaribus et interdum solitariis; pedicelli 3-4 mm. longi, parce pubescentes. *Calyx* undulate lobatus, extra glaber, intus pubescens, 2 mm. longus. *Corollae* tubus urceolatus, 2-5 mm. longus, lobis 3 divaricatis ovato-ellipticis 3 mm. longis; stamina pubescentia.

LIBERIA: Dukwia River, Oct., *Cooper* 92 (type); 316; Péahtah, in high bush of original forest, Oct., *Linder* 1029; 1066.

Described as a moderately plentiful tree up to 40 ft., with a long slender bole but no buttresses; used for house poles. Vernacular names: *Drebah*; *Bluchu*. The leaves are boiled for a black dye.

#### SAPOTACEAE

**Chrysophyllum sericeum** *A. Chev. ex Hutch. et J. M. Dalz. op. cit.* 9; species imperfecte cognita, foliis basi cordatis fere panduratis valde distincta.



*Ramulus foliiferus* tantum visus, adpresse tomentosus, internodiis 3-4 cm. longis. *Folia* basi cordata, elongato-oblonga vel fere pandurata, abrupte caudato-acuminata, 11-15 cm. longa, 3-6 cm. lata, supra glabra costa media juniore excepta, infra dense cinnamomeo-sericea, margine undulata; nervi laterales utrinsecus 12-15, infra prominentes, a costa sub angulo lato abeuntes et prope margines conjuncti. *Flores* et *fructus* non visi.

IVORY COAST: Indénié, between Zaranou and Bébou, Dec., 1909, *Chevalier* 22627 (type). GOLD COAST: without locality, *Vigne* 2059.

Flowers and fruits of this very distinct species are much desired. It may be recognised at once amongst the African species by the deeply cordate-based leaves.

***Chrysophyllum glomeruliferum*** *Hutch. et J. M. Dalz. op. cit.* 9. *C. obovatum* Engl. Monogr. Sapot. 43 (1904), non G. Don. *Manilkara* ("Manilhora") *dahomeyensis* A. Chev. Expl. Bot. Afr. Occid. Franç. 394 (1920), non Pierre; species foliis obovatis ad oblongo-oblanco-latis infra cinereo-tomentellis, floribus glomeratis sessilibus valde distincta.

*Ramuli* graciles, internodiis elongatis, juniores adpresse strigillosi. *Folia* anguste obovata ad late oblongo-oblanco-lata, late acuminata et obtuse mucronata, basi angustata, 8-18 cm. longa, 3-6 cm. lata, supra pallida, glabra et nitidula, infra cinereo-tomentella et parce strigilloso-pubescentia; nervi laterales utrinsecus 15-20, patuli, infra prominuli, prope marginem conjuncti, nervis secundariis distinctis; petioli 1-1.5 cm. longi, leviter pubescentes. *Flores* in ramulis glomerulati, sessiles. *Sepala* ovata, crassa, 2.5 mm. longa, extra parce pubescentia. *Corolla* calyce paullo longior. *Antherae* basi sagittatae, crassae, 1.5 mm. longae. *Ovarium* hirsutum, stylo crasso adpresse pubescente.

SIERRA LEONE: Mt. Gonkwi, Feb., *Scott Elliot* 4867 (type). DAHOMEY: Zagnanado, Feb., *A. Chevalier* 23034; Savalou, May, *Chevalier* 23732. UGANDA: Toro, 1400 m., *M. T. Dawe* 460; 1004; Budongo, *Fyffe* 165; Busingiro, May, *Eggeling* 1216 (For. Herb. 1324). KENYA: Kakamega, May, 1800 m., *Dale* (For. Herb. 3124).

This is another striking example of the close affinity and sometimes identity of the ligneous vegetation of West Africa and Uganda.

***Chrysophyllum metallicum*** *Hutch. et J. M. Dalz. op. cit.* 9; affine *C. albido* G. Don, sed foliis infra metallico-nitidis, floribus subsessilibus differt.

*Arbor* 25 m. alta, trunco 0.75 m. diametro, ligno duro roseo-brunneo, succo lacteo; ramuli adpresse pubescentes. *Folia* oblanceolata, obtuse acuminata, ad basin attenuata, 8-15 cm. longa, 2.5-4.5 cm. lata, supra glabra et crebre reticulata, infra metallico-nitida, breviter pubescentia; nervi laterales utrinsecus 10-15, infra prominentes, a costa sub angulo 45° abeuntes, venis inter nervos plus minusve reticulatis; petioli 1-2 cm. longi, adpresse tomentelli. *Flores* axillares, subsessiles, subfasciculati.

GOLD COAST: S. Ashanti; Banka, 140 m., Sept., *C. Vigne* 1364 (type).

A medium-sized tree 80 feet high and 6 ft. girth, with small cream flowers in clusters on the branchlets; the wood is hard, pink-brown, with a white latex, and when fresh it sinks in water. Vernacular name: *Krankabe* (Ashanti).

***Chrysophyllum giganteum*** *A. Chev. ex Hutch. et J. M. Dalz.* op. cit. 9. *C. obovatum* *A. Chev. Veg. Util.* 5, 237 (1909), non *G. Don*; species foliis infra adpresse sericeis, fructibus lignosis 4-5 cm. longis distincta.

*Arbor* 30 m. alta, trunco 0.5-0.7 m. diametro; ramuli dense foliati, sericeo-tomentosi. *Folia* elliptico-obovata, breviter et late acuminata, basi subcuneata, 12-20 cm. longa, 5-8 cm. lata, supra glabra, infra adpresse sericea; nervi laterales utrinsecus circiter 11, a costa sub angulo lato sensim curvati, prope marginem evanidi, nervis tertiariis obliquis obscuris; petioli 1 cm. longi, molliter tomentelli. *Flores* alabastro tantum visi, axillares, tomentosi. *Fructus* subglobosi, 4-5 cm. longi, lignosi, glabri, exocarpio fere 1 cm. crasso.

IVORY COAST: Capiékrou, Jan., *A. Chevalier* 16180. Morénou, near Akabélé Krou, fr. Dec., *A. Chevalier* 22512 (type). GOLD COAST: Offin River, W. Ashanti, waterside, *T. F. Chipp* 115.

***Chrysophyllum perpulchrum*** *Mildbr. ex Hutch. et J. M. Dalz.* op. cit. 10. *C. sp.* *Holl. in Kew Bull. Add. Ser.* 9, 398; species foliis infra rufo-tomentosis valde distincta; affine *C. fulvo* *S. Moore*, sed foliis majoribus infra permanente rufo-tomentosis (nec demum cinereis) differt.

*Arbor* usque ad 32 m. alta; ramuli internodiis brevibus, angulati, rufo-tomentelli. *Folia* oblongo-elliptica, obtuse et breviter acuminata, 12-22 cm. longa, 6-8 cm. lata, supra mox glabra, infra rufo-tomentosa, nervis lateralibus utrinsecus 10-20 infra valde prominentibus; petioli 2-2.5 cm. longi, stellato-tomentelli. *Flores* axillares, dense glomerati, sessiles, rufo-tomentosi. *Sepala* inaequalia, ovata, 3-4 mm. longa, crassa, interiora marginibus tenuibus. *Corolla* subglobosa, 3 mm. longa, glabra. *Antherae* cordatae, acutae. *Ovarium* dense hirsutum, stylo brevi crasso.

GOLD COAST: Ntakem, W. Prov., Mar., *C. Vigne* 234; 1185. S. NIGERIA: Benin; *Hitchens*; *Thomson* 8; *Sankey*. CAMEROONS: Dengdeng, 750 m., Apr., *J. Mildbraed* 8882 (type). UGANDA: Budongo, tree 80-100 ft., *M. T. Dawe* 789; 987; July, *Brasnett* 131.

Vernacular names: *Ejar* or *Ajar* (Sefwi, Gold Coast); *Attabini* (Ashanti); *Ekduro* and *Osanko* (S. Nigeria).

Until named for our Flora, leaf-specimens of this striking tree had lain for many years in the herbarium unidentified, for it was collected by Dawe in Uganda as long ago as 1905. He remarked that it was one of the most striking trees of the Budongo Forest on account of its rufous leaves and its enormous height. Dawe himself

recognised its identity with unnamed West African specimens. Brasnett remarks that it is found scattered in the Budongo Forest in groups, a number of young trees growing around a parent. The bark is corrugated, the blaze being reddish brown with white sap exuding.

**Pachystela argentea** *A. Chev. ex Hutch. et J. M. Dalz. op. cit. 10.*

*Ramuli* robusti, glabri, apicem versus 1 cm. diametro. *Folia* conferta, pandurato-obovato-oblonga, abrupte acuminata, ad basin leviter cordatum attenuata, 15–25 cm. longa, 6–9 cm. lata, undulata, sicco supra pallide viridia, infra pallide brunnea, haud reticulata; nervi laterales utrinsecus circiter 15, e costa sub angulo 45° abeuntes, marginem versus evanidi; stipulae subsistentes, longe subulatae, 2–5 cm. longae. *Flores* et *fructus* non visi.

DAHOMÉY: Bokotou Forest Reserve, near Sakete, Porto-Novo Circle, *A. Chevalier* 22865 (type).

An imperfectly known species the status of which must remain doubtful until flowers and fruits are collected.

**Pachystela micrantha** *Hutch. et J. M. Dalz. op. cit. 11. Mimusops micrantha* *A. Chev. Veg. Util. 5, 244 (1909); Explor. Bot. Afr. Occid. Franç. 393 (1920); affinis P. brevipedis* Baill., foliis late et obtuse acuminatis minoribus, stipulis deciduis differt.

*Arbor* ad 30 m. alta; ramuli minute adpresse pubescentes, apice dense foliati. *Folia* oblongo-oblancheolata vel obovato-elliptica, obtusissime et late acuminata, basi acuta, 8–13 cm. longa, 2.5–4 cm. lata, glabra, nervis lateralibus numerosis obscuris; petioli 1 cm. longi, parce adpresse pubescentes vel mox glabri; stipulae deciduae. *Flores* in ramulis annotinis fasciculati, breviter pedicellati, virides; pedicelli puberuli. *Sepala* 5, late ovata vel suborbicularia, 1.5 mm. longa, subcoriacea, minutissime ciliolata. *Corollae* tubus 1 mm. longus, glaber; lobi elliptici, 2.5 mm. longi. *Stamina* 5, corolla paullo longiora; antherae 1.35 mm. longae. *Ovarium* dense hirsutum; stylus 2 mm. longus, basin versus leviter pubescens, stigmatem leviter incrassato.

SIERRA LEONE: Njala, tree 20 ft. high, flowering only for a few days, flowers green, May, *F. C. Deighton* 696; 2617; *C. E. Lane-Poole* 458. IVORY COAST: Anyama, Feb., *A. Chevalier* 16226 (type); Aboisso, Afr., *A. Chevalier* 16307; between Zaéblé and Boutoubéré, May, *A. Chevalier* 17979. GOLD COAST: Abofaw, tree 35 ft., 3 ft. girth, wood hard, June, *C. Vigne* 1179. S. NIGERIA: Sapoba, *J. D. Kennedy* 1671.

According to Kennedy, For. Fl. S. Nigeria, 195 (1936), the Beni brass-workers obtain the best charcoal from the wood. The *Sokei* (Mende), *Kpengilopio* (Kisi) of Sierra Leone (*Deighton*).

Deighton states that the fruit is edible and has a pleasant taste.

**Delpydora gracilis** *A. Chev. ex Hutch. et J. M. Dalz. op. cit. 11; a D. macrophylla* Pierre foliis basi haud auriculatis facile distinguitur.



*Frutex* usque ad 1 m. altus ; rami hispidi. *Folia* elongato-obovata, longe et acute acuminata, basi attenuata, usque ad 30 cm. longa et 9 cm. lata, infra in costa media pilosa ; nervi laterales utrinsecus 18–20, patuli, nervis tertiariis tenuibus obliquis ; petioli dense setosi. *Flores* axillares, fasciculati vel solitarii ; pedicelli parce setulosi. *Sepala* extra laxe setosa, oblonga, 5 mm. longa. *Corolla* late tubulosa, glabra, 6 mm. longa, lobis ellipticis 3 mm. longis longitudinaliter nervosis. *Filamenta* libera, glabra ; antherae circa stylum conniventes, 2 mm. longae. *Ovarium* dense setosum ; stylus subulatus, 4 mm. longus, glaber. *Fructus* depresso-globosus, circiter 4 cm. diametro, dense setosus, exocarpio crustaceo. *Semina* oblonga, 2.5 cm. longa, testa carnosia.

LIBERIA : Dukwai River, Monrovia, fr. Oct.–Nov., *Cooper* 29 ; 46 ; 175. IVORY COAST : Cavally basin, *A. Chevalier* 19583 (type) ; 19672. GOLD COAST : near Prestia, Sept., *C. Vigne* 3083. *Simpa*, *C. Vigne* 1973.

Described by the collectors as a small shrub common in the undergrowth in evergreen forest ; flowers yellow ; fruits red and covered with bristles. The habit and appearance must be very similar to that of dwarf species of *Tetracera* (*Dilleniaceae*) such as I have collected in Northern Rhodesia.

***Sideroxylon altissimum*** *Hutch. et J. M. Dalz. op. cit. 12. Hormogyne altissima* A. Chev. Explor. Bot. Afr. Occid. Franç. 392 (1920), nomen subnudum ; species foliis haud acuminatis ellipticis basi rotundatis glabris nervis lateralibus utrinsecus 12–15, pedicellis et calyce tomentellis distincta.

*Arbor* 35–40 m. alta, trunco cylindrico ; ramuli puberuli. *Folia* elliptica, basi rotundata, apice emarginata, 5–10 cm. longa, 4–6 cm. lata, glabra, nervis lateralibus infra distinctis ; petioli 1 cm. longi, parce puberuli. *Flores* axillares, fasciculati ad subsolitarii ; pedicelli tomentelli, circiter 5 mm. longi. *Calyx* extra minute tomentellus, lobis oblongo-ellipticis 4.5 mm. longis. *Corolla* 5.5 mm. longa, tubo late cylindrico glabro, lobis rotundato-truncatis minutissime ciliolatis. *Stamina* medio corollae tubi inserta. *Ovarium* inferne dense hispidum ; stylus 3 mm. longus, glaber, minute lobulatus. *Fructus* obovoideus, 1.5 cm. longus, exocarpio carnosio. *Semina* ovoidea, hilo lato elliptico fere aequilongo.

FRENCH GUINEA : various localities (*Chev. l.c.*), *A. Chevalier* 13129 ; 13141 (type) ; 13404 ; 13583 ; 20749. GOLD COAST : Abetifi, Kwahu, Mar., *W. H. Johnson* C24 ; *Brent in Herb. Chipp* 543 ; near Buzumtwi, big tree 120 ft. high, 8 ft. in girth, in closed forest, small yellow flower, wood white, Dec., *Vigne* 1498.

***Omphalocarpum pachysteloides*** *Mildbr. ex Hutch. et J. M. Dalz. op. cit. 13* ; species floribus in ramulis defoliatis fasciculatis, foliis oblongo-oblanceolatis obtuse acuminatis distincta.

*Arbor* (?), ramulis adpresse tomentosis mox glabrescentibus. *Folia* oblongo-oblanceolata, late et obtuse acuminata, basi angustata,



12–30 cm. longa, 4–8 cm. lata, glabra, infra laxe reticulata, nervis lateralibus utrinsecus 8–10 intra marginem conjunctis; petioli usque ad 4 cm. longi, supra costati. *Flores* albi, in ramulis defoliatis fasciculati; pedicelli 5 mm. longi, adpresse tomentosi. *Calyx* tomentosus; segmenta ovata, apice rotundata, 8 mm. longa. *Corolla* brevis, profunde 5-lobata, lobis ovatis 3.5 mm. longis. *Stamina* circiter 15, fasciculis petalis opposita; staminodia inter petala, petaloidea, triangularia, acute acuminata. *Ovarium* tomentosum; stylus rigidus, glaber, 2.5 mm. longus.

SIERRA LEONE: Kabusa, Apr., *Scott Elliot* 5471. CAMEROONS: Kongola, 750–800 m., in galerie forest, Apr., *Mildbraed* 9021 (type); near Dengdeng, Mar., *Mildbraed* 8561; 8789.

**Mimusops Heckelii** *Hutch. et J. M. Dalz.* op. cit. 14; comb. nov. *Dumoria Heckelii* A. Chev. in *Compt. Rend. Acad. Sci. Par.* **145**, 267 (1907). *Tieghemella Heckeliana* Pierre ex Dubard in *Ann. Mus. Col. Marseille*, Ser. 3, **33**, in obs. (1915).

#### MYRSINACEAE

**Afrardisia oliganthe** *Gilg et Schellenb.*, quoted by us (op. cit. 15) as of these authors in MS., was published with a description in *Engl. Bot. Jahrb.* **48**, 517 (1912).

**Embelia djalonensis** *A. Chev. ex Hutch. et J. M. Dalz.* op. cit. 16. *E. guineënsis* Mez in *Engl. Pflanzenr.* **4**, Heft 236, 331, non Baker; affinis *E. guineënsi* Baker, costa media foliorum infra lanata, nervis lateralibus conspicuis differt.

*Scandens*; rami teretes; ramuli laterales ultimi breves glabri. *Folia* obovato-elliptica, apice rotundata vel emarginata, basi late cuneata, 8–9 cm. longa, 4–5 cm. lata, utrinque nigro-punctata, costa infra usque ad supra medium lanata; nervi laterales numerosi, utrinque conspicui, a costa sub angulo 45° abeuntes, marginem versus laxe ramosi; petioli 1 cm. longi. *Racemi* brevissimi; pedicelli 2–3 mm. longi, parce puberuli. *Sepala* late triangularia, 0.75 mm. longa. *Petala* elliptica, 3 mm. longa, nigro-punctata. *Stamina* fere ad medium petalorum adnata; antherae 1.25 mm. longae, filamentis breviores. *Ovarium* glabrum; stylus bifidus. *Fructus* globosus, 6 mm. diametro, lineis interruptis longitudinaliter notatus.

FRENCH GUINEA: Kollangui, Mar., *A. Chevalier* 13537 (type); Dantilia (Niger), fr. Mar., *Scott Elliot* 5266.

**Maesa nuda** *Hutch. et J. M. Dalz.* op. cit. 16; affinis *M. lanceolatae* Forsk., sed foliis obovatis parte inferiori integris, inflorescentiis paucifloris et parce ramosis, floribus distincte pedicellatis differt.

*Frutex* ut videtur scandens; ramuli glabri. *Folia* obovata, parte inferiore integra, superiore obtuse dentata, basin versus leviter rotundata vel late cuneata, breviter acuminata, 10–12 cm. longa, 5–7 cm. lata, glabra; nervi laterales utrinsecus circiter 6, leviter ramosi; petioli 1.5–2 cm. longi. *Inflorescentia* basi

ramulo leviter adnata, parce ramosa, gracilis, usque ad 10 cm. longa; bracteae subulato-lanceolatae, 2 mm. longae; pedicelli bracteis paullo longiores; bracteolae 2, superiore calyce subtendente triangulari. *Calycis lobi* ovato-triangulares, acuti. *Petala* elliptica, parva. *Ovarium* glabrum.

FRENCH GUINEA: without locality, 1906, *Farmer* 327.

#### LOGANIACEAE

**Mostuea hymenocardioides** *Hutch. et J. M. Dalz.* op. cit. 20; affinis *M. Thomsonii* Benth., sed foliis acute acuminatis ramulis junioribus utrinque lineis pilorum instructis, fructibus multo majoribus differt.

*Frutex* ramosissimus, gracilis, ad 1.75 m. altus; ramuli foliiferi brevissimi, pilorum lineis binis oppositis ornati. *Folia* ovata, late acuminata, basi latissime cuneata, 4-5 cm. longa, usque ad 3 cm. lata, nervorum axillis pilosis exceptis glabra, nervis lateralibus utrinsecus circiter 4-5. *Inflorescentiae* pauciflorae, ramulos terminantes; bracteae subulatae. *Calycis segmenta* linearia, 4.5 mm. longa, breviter ciliata. *Corolla* late tubuloso-turbinata, 1 cm. longa, glabra, lobis parvis. *Stamina* vix exserta; filamenta inaequilonga, apicem versus parce pubescentia. *Ovarium* ovoideum, glabrum; stylus 1.25 mm. longus, lobulatus. *Fructus* 1 cm. longus, late bilobatus, lobis obtusis ad rotundatis glabris conspicue nervosis.

FRENCH GUINEA: near Dantilia River, Mar., *Scott Elliot* 5268 (type); common on Niger bank at Farana, *Scott Elliot* 5038. SIERRA LEONE: Laminaiya, Apr., *N. W. Thomas* 123; 10013; 10248; near Tassin, Scarcies River, Jan., *Scott Elliot* 4515.

**Lachnopylis Mannii** *Hutch. et M. B. Moss* in *Flora West Trop. Afr.* 2, 20 (1931). *Nuxia Mannii* Gilg in *Engl. Bot. Jahrb.* 32, 140 (1902).

FRENCH GUINEA: Futa Jallon, in the bush at Diaguissa, Dec., *O. Caille in Herb. Chevalier* 18011. IVORY COAST: Upper Sassandra, Mt. Boho, over 800 m., May, *A. Chevalier* 21494. CAMEROONS MT.: 2400 m., Jan., *G. Mann* 1206 (type); 2300 m., *G. Mann* 2184; Musaku Camp, 1500 m., *T. D. Maitland* 458; 996; Nyanga Camp, 2500 m., Dec., *T. D. Maitland* 1194; Onyanga, 2700 m., *M. Steele* 64A.

**Lachnopylis guineënsis** *Hutch. et J. M. Dalz.* op. cit. 20; affinis *L. Mannii* *Hutch. et M. B. Moss*, sed foliis serratis usque subintegris ellipticis utrinque angustatis, calyce extra leviter puberulo differt.

*Arbor* usque ad 8 m. alta; rami erecti, glabri. *Folia* late oblanceolata ad rhomboideo-obovata, 4-6 cm. longa, 2-3.5 cm. lata, apicem versus leviter serrata, glabra; petioli 0.5-1 cm. longi. *Inflorescentia* terminalis, dense corymbosa; bracteae oblongae, pedicellis dimidio breviores. *Calyx* 6-7 mm. longus, extra breviter puberulus, intus adpresse pilosus, lobis triangularibus marginibus hyalinis. *Corollae tubus* cylindricus, 5 mm. longus, utrinque glaber; lobi oblongo-ovati, apice cucullati, intus basin versus et extra

ubique reflexo-setoso-pilosi. *Stamina* longe exserta. *Ovarium* dense pilosum ; stylus glaber.

SIERRA LEONE : Mt. Gonkwi, 1000 m., on rocks fringing the precipice, tree or shrub 20 ft. high., Feb., *Scott Elliot* 4824 (type). GOLD COAST : Bana Hill, Krobo, in deciduous forest, tree 20-25 ft., flowers white, Mar., *F. R. Irvine* 893.

**Gaertnera Cooperi** *Hutch. et M. B. Moss* in *Flora West Trop. Afr.* 2, 21 (1931). *G. paniculata* A. Chev. *Explor. Bot. Afr. Occid. Franç.* 444 (1920), partim, non Benth. ; affinis *G. paniculatae* Benth., sed inflorescentia minore compacta, pedunculo puberulo, costa foliorum infra puberula (nec pilosa) differt.

*Arbor* parva usque ad 8 m. alta ; ramuli satis robusti, dense puberuli, demum glabrescentes. *Folia* elliptica, breviter acuminata, basi subrotundata, 15-25 cm. longa, 7-10 cm. lata, costa infra puberula excepta glabra ; nervi laterales utrinsecus 8-10, infra prominentes, tertiariis numerosis obliquis ; petioli 1-2 cm. longi, puberuli ; stipulae intrapetiolares, breves, mox deciduae. *Inflorescentia* terminalis, multiflora, corymbosa, compacta, circiter 6 cm. diametro, ubique puberula ; bractae ovatae, subacutae, 3-4 mm. longae. *Calyx* undulatim lobatus, 3 mm. longus, rufescens. *Corolla* tubulosa, cylindrica, 1.5 cm. longa, extra minutissime puberula ; lobi oblongi, 8 mm. longi, apice inflexi, intus albo-villosi ; tubus infra apicem versus annulo pilorum alborum instructus. *Filamenta* 0.5 cm. longa, glabra ; antherae 3 mm. longae. *Stylus* brevis, protunde bilobatus, lobis crassis pubescentibus acutis. *Fructus* baccatus, globosus, primum cinereo-viridis demum caeruleus (siccio niger), circiter 1 cm. diametro.

FRENCH GUINEA : various localities (Chev. l.c.), *A. Chevalier* 12420 : 12664 ; 12936. LIBERIA : Dukwia River, *G. P. Cooper* 202 ; 287 (type) ; Cape Palmas, *G. P. Cooper* 465 ; Sinoe Basin, *A. Whyte* ; Du River, Aug., *D. H. Linder* 286 ; Monrovia, Nov. (fl. & fr.), *D. H. Linder* 1487A. GOLD COAST : Ateiku, 100 m., shrub with white flowers in undergrowth of closed forest, May, *Vigne* 1948.

**Gaertnera salicifolia** *Hutch. et Gillett* in *Flora West Trop. Afr.* 2, 21 (1931) ; species foliis oblongis ad lanceolatis longe acuminatis, stipulis tubulosis mox deciduis, corollae lobis intra albo-villosis distincta.

*Arbor* 7 m. alta ; ramuli graciles, papilloso-pubescentes. *Folia* oblonga vel oblongo-lanceolata, apice longe acuminata et subacuta, basi acuta, 6-12 cm. longa, 1.5-3 cm. lata, nervis lateralibus utrinsecus circiter 5 puberulis exceptis glabra ; petioli 3-5 mm. longi, puberuli ; stipulae intrapetiolares mox deciduae, tubulosae ; tubus 5-10 mm. longus, puberulus, lobis filiformibus paucis 5-7 mm. longis. *Inflorescentia* terminalis, pauciflora, laxa, puberula ; bractae lineari-filiformes, puberulae ; flores sessiles, ternati. *Receptaculum* extra puberulum. *Calyx* undulate dentatus, puberulus, 1.5 mm. longus. *Corolla* cylindrica, 7 mm. longa, dimidio superiori leviter et subito

ampliata, extra minutissime puberula; lobi 5, anguste oblongi, apice inflexi, 3 mm. longi, intra dense albo-villosi. *Antherae* fauce insertae, subsessiles, 1.5 mm. longae. *Ovarium* glabrum; stylus breviter bilobatus, apicem versus parce puberulus.

LIBERIA: Dukwia River, June, *G. P. Cooper* 277 (type).

Canoes are made from the wood, which is soft and works easily; the fruits yield an oil used for "crow-crow" itch. Vernacular name: *Mohr-ehu*.

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## VI—NOTES ON AFRICAN GRASSES: XXI.\*

C. E. HUBBARD.

The following new species and new genus will be described more fully in a later number of the Kew Bulletin.

***Agrostis Taylori*** C. E. Hubbard, sp. nov.; affinis *A. isopholi* C. E. Hubbard, sed culmis simplicibus basin versus exceptis enodibus, panícula usque ad 5 cm. lata, ramis plerumque binis, rhachilla minute producta glabra, lemmate glabro, arista longiore 2.5–4 mm. longa, palea 1 mm. longa differt.

UGANDA: Kigezi District; Mt. Muhavura, 3750 m., *Taylor* 2133 (type); Mt. Mgahinga, 3420 m., *Taylor* 1954.

***Agrostis bryophila*** C. E. Hubbard var. **elgonensis** C. E. Hubbard, var. nov.; a typo differt culmis usque ad 10 cm. altis fasciculatis e rhizomate brevi ortis rigidis, foliorum laminis setaceis apice obtusis usque ad 5 cm. longis complicato-convolutis vel complicato-involutis, paniculis 1.8–3 mm. longis 1.2–1.8 cm. latis, rhachi rigida, ramis inferioribus usque ad 1.8 cm. longis, spiculis 4 mm. longis, lemmate fere 3 mm. longo, callo breviter barbato.

KENYA COLONY: Mt. Elgon, summit of unnamed peak between Koitoboss and Loven's Peak, 4250 m., *Taylor* 3703.

***Leptagrostis*** C. E. Hubbard, gen. nov.; a *Calamagrosti* Adans. glumis valde inaequalibus inferiore superiore brevior, lemmate acute acuminato apice breviter aristato glumae superiori subaequali vel ea paullo longiore ut glumae tenuiter membranaceo, ligulis ad seriem ciliorum redactis differt.

Species 1, Abyssinia. ***L. Schimperiana*** (Hochst.) C. E. Hubbard, comb. nov. *Calamagrostis Schimperiana* Hochst. in *Flora*, 38, 202 (1855).

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## VII—MISCELLANEOUS NOTES.

***Pterocarpus Draco* L.**—The case outlined below, which recently came to the writer's notice, illustrates well the application of the rule concerning "illegitimate names."

The name *Pterocarpus Draco* was published by Linnaeus (Sp. Pl. ed. 2, 1662: 1763) with references to five previous works: his own *Materia Medica* (1749); Jacquin, *Sel. Stirp. Amer. Hist.* (1763); Loeffling, *Iter Hisp.* (1749); Commelin, *Hort. Med. Amstel.* (1697);

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\* Continued from K.B. 1936, 501.



and Rumphius, Herb. Amb. (1750). Three of these references (Linnaeus, Commelin, Rumphius) refer to an Asiatic plant; the remaining two (Jacquin, Loeffling) to an American species to which Jacquin (l.c. 283) had given the name *Pterocarpus officinalis*. [Loeffling's work, though post-1753 and earlier than Jacquin, did not employ the binomial system of nomenclature.] It is evident from Linnaeus's reference to *Pterocarpus* in his Mat. Med. 184, where he cites his Fl. Zeyl. 196 (1747), that his conception of the plant was based primarily upon Commelin's description and figure (l.c. 1, 213, t. 109) of *Draco arbor indica siliquosa, populi folio, Angsana vel Angsava javanica*, which may therefore be regarded as the type of *Pterocarpus Draco* L.

Under International Rules, however, this name cannot be used for the species in question. Linnaeus regarded the Asiatic and the American plants as conspecific: consequently, as there already existed\*, at the time of publication of *P. Draco* L., the valid name *P. officinalis* Jacq. for the American element, Linnaeus's name was superfluous, although based upon a different type. Article 60 (1) states that such superfluous names are illegitimate and must be rejected: "A name is illegitimate.....if it was superfluous when published, i.e. if there was a valid name (see Art. 16) for the group to which it was applied, with its particular circumscription, position and rank" (Briquet, Intern. Rules, ed. 3, 19: 1935).

The correct name for the Asiatic species is therefore *P. indicus* Willd. Sp. Pl. 3, 904 (1803), which has, fortunately, been universally adopted. For the American plant Willdenow wrongly employed the name *P. Draco* L., citing *P. officinalis* Jacq. in synonymy. Of *P. indicus* he states (l.c.): "ex icone Rumphii mihi tantum nota species."† He was therefore not at liberty to adopt the specific epithet *Draco* for the latter species (even had he not already wrongly used it for the former), as he would have been had he based it upon the Linn. Mat. Med. and Commelin references (i.e. the type of *P. Draco* L.), since in that case a later homonym would not have been created. *P. Draco* L. (*sensu stricto*) and *P. indicus* Willd., though universally regarded as conspecific‡, are actually based upon different types, originating from Java and Amboina respectively. The fact that the type of *P. indicus* was cited by Linnaeus, when publishing *P. Draco*, is immaterial.

H. K. AIRY-SHAW.

\*As evidenced by the fact that Linnæus cites Jacquin, whereas Jacquin only cites (erroneously) Linn. Mat. Med. and Rumphius, the latter with a query. In the later editions of his work ("Pl. Amer. Pict." 98, t. 264, fig. 91: [1780]; "cum approb. auct. ad exempl. maior. op....recusum," 256: 1788) Jacquin employed the name *P. Draco* L., omitting all mention of his own *P. officinalis*.

†Cf. Merrill, Interpr. Rumph. Herb. Amboin. 270 (1917).

‡Rumphius himself (Herb. Amb. 2, 210, *observatio*: 1750) identifies his plant with that of Commelin, though noting that the latter's plate shows a plant with fewer leaflets. Commelin figured a young plant raised in the Amsterdam Botanic Garden from Javanese seed received from Andreas Cleyer.

**The Algae and their Life Relations.\***—This book will appeal to botanists in all English-speaking countries, for it is the first attempt, with the exception of Professor Fritsch's work, of which so far only one volume has appeared, to present in English a concise and comprehensive account of the algae.

The book opens with an account of the relationships of the major groups based on the theory of parallel development. In the second chapter, dealing with geographical range, the author stresses her belief that distribution depends largely on the illumination factor and she illustrates her conclusions from the distribution of the five great groups of algae in the Pacific Ocean. This is followed by a discussion on pigmentation and food reserves.

The main part of the work is concerned with classification, taking the simplest group, the *Cyanophyceae*, first and leading up to the *Chlorophyceae*. The scheme adopted is to set out in tabular form each class subdivided into orders, families and genera, and to follow this by a description of every group mentioned in the table. In this section the treatment seems rather disproportionate: for instance, in presenting the taxonomic table at the beginning of each section, one page is given to *Rhodophyceae*, while the *Phaeophyceae*, a much smaller class, is given one and a half pages, with the result that in the *Rhodophyceae* the family *Gigartinales* is represented by *Chondrus* only, while in the *Phaeophyceae* the treatment of *Lessoniaceae* extends to seven genera. Naturally the book has a North American bias, and this explains the inclusion among the brown algae of several monotypic genera such as *Pterygophora*, *Dictyonon* and *Thalassiosiphon*, but it hardly warrants the absence of *Gigartina* among the red algae.

In the section on the *Chlorophyceae* a helpful comparison is given by the introduction of types from the higher plants and animals. There are numerous life-cycle diagrams and the book is well illustrated throughout. Finally there are interesting chapters on algae as a source of contamination, and as food for men and the lower animals. An appendix supplies useful instructions in drawing for publication.

Professor Tilden has quoted freely from well-known authors. Typographical errors seem to be comparatively few, but some obvious ones, such as "fructose" (page 30), and "Greek unda" (page 278), ought not to have escaped attention. Twenty-two pages of bibliography complete the book. It may without hesitation be recommended as an up-to-date text book for advanced students.

C. I. DICKINSON.

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**Poisons Law.†**—With the present complexity of poisons regulations it is difficult to realise that such legislation is less than a century old. The first poisons act was passed in 1851 for the purpose

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\* By J. E. Tilden. Oxford University Press and University of Minnesota Press, London and Minneapolis, 1935. Pp. xii 550, figs. 257. Price \$5.00.

† By Hugh N. Linstead. The Pharmaceutical Press, London, 1936. Pp. 444. Price 5s.



of restricting the sale of arsenic which had come into prominence on account of its increasing use for criminal poisoning. The first Pharmacy and Poisons Act, which followed in 1868, formed the basis of pharmacy law up to 1933, when the present act became law. The acts of 1898, 1908 and 1929 introduced relatively slight changes, but the Dangerous Drugs Act of 1920 was an event of major importance, giving effect to the Hague Convention of 1912 on habit-forming drugs. The problem of drug addiction is international and has since been the sphere of much helpful work under the auspices of the League of Nations. The work of the League in this connection is outlined in a most interesting chapter on the "International background to the Dangerous Drugs Acts" contributed by Sir Malcolm Delevigne.

The present Pharmacy and Poisons Act follows very closely the recommendations of the Departmental Committee which was set up in 1926 and published its report in 1930. Of several important changes introduced, perhaps the most far reaching in its effects is the delegation of power to a Poisons Board to prepare a list of poisons and to amend it when necessary. The recommendations of the Poisons Board are subject to the approval of the Home Secretary, who is also empowered, in consultation with the board, to make rules for the regulation of the sale, storage, dispensing and other matters in relation to poisons. In this way, elasticity in the working of the act is provided for, at the same time achieving a desirable simplicity in the statute itself. It is evident that great care has been taken in the framing of the law to restrict the legitimate use of poisons as little as possible, while at the same time illegal use is made difficult.

The book deals in turn with each section of the Poisons and Pharmacy Act and the Dangerous Drugs Acts and Regulations, explaining their significance to all classes of individuals concerned with poisons. The texts of the various acts and rules, so far as they are at present in force, are given in a large appendix. A second smaller appendix listing the poisons commonly employed in pharmacy with a brief indication of the rules applying to them, should be invaluable to pharmacists. This work of reference should be on the shelves of all having frequent transactions in poisons.

R. MELVILLE.

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**Botanical Magazine.**—The final part (part 4) of volume 159 was published on November 9th and contains the following dedication of the volume to Mr. C. T. Musgrave, together with his portrait: "To Charles Thomas Musgrave, B.A., V.M.H., J.P., a prudent and valued treasurer of the Society, eminent as a cultivator of rare and beautiful plants in two renowned gardens at Hascombe, both of them created by him and instinct with his spirit, a friend as generous of his knowledge of plants as of his experience of the law,

this volume of the Botanical Magazine is gratefully dedicated by the Royal Horticultural Society."

The following plants are figured :—*Catalpa Fargesii* Bur. forma *Duclouxii* (Dode) Gilmour (t.9458), from W. China ; *Bulbophyllum orthoglossum* Wendland & Kraenzlin (t.9459), a native of the Philippine Islands ; *Sorbus Prattii* Koehne (t.9460), a white-fruited Chinese species ; *Mutisia subulata* Ruiz & Pavon (t.9461), a recent introduction from the Central Provinces of Chile ; *Fritillaria glaucoviridis* Turrill (t.9462), from S. Asia Minor ; *Herpetospermum pedunculatum* (Seringe) C. B. Clarke (9463), a native of N. India ; *Rhododendron crinigerum* Franch. (t.9464), from S. E. Tibet and N. W. Yunnan ; *Lewisia brachycalyx* Engelmann ex A. Gray (t.9465), recently re-introduced from Western North America ; *Medinilla Scortechinii* King (t.9466), from the Malay Peninsula ; *Magnolia globosa* Hook. f. & Thoms. (t.9467), extending from Sikkim to S. E. Tibet and N. W. Yunnan and *Gentiana cephalantha* Franch. apud Hemsl. (t.9468), a species from N. W. Yunnan, nearly allied to *G. rigescens* Franch., with which probably it hybridises.

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**Better Plants and Animals—A Survey of Superior Germ Plasm.**—The Yearbook of Agriculture for 1936 of the United States Department of Agriculture\* is a noteworthy departure from its predecessors of recent years. Instead of presenting brief summaries of miscellaneous new developments in American agriculture, 1022 out of a total of 1189 pages are devoted to "a survey of superior germ plasm made by the Committee of Genetics" set up by the Secretary of Agriculture. It deals with modern breeding research under the following crop headings, each written by recognised authorities on the subject ; wheat, barley, oats, rice, maize, sorghum, sugarcane, sugar beet, cotton, flax and tobacco. In the matter of livestock it deals similarly with beef and dual-purpose cattle, dairy cattle, pigs, sheep, horses and mules, and poultry. The work comprises not only the immense amount of research achieved and in progress in the United States, but it has also been possible, by means of several questionnaires distributed to foreign countries that are working on the same problems, to enlarge greatly the scope of the survey. It says much for the manner in which such questionnaires have been prepared that the response has been most encouraging. "In the case of crop plants a wealth of material poured in dealing with breeding work in the past and present, much of which is not available elsewhere and could not have been obtained by any other method."

The book should prove of great value to all who are concerned in breeding work, whether with plants or animals.

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\* Published by the United States Department of Agriculture, 1936. Pp. 1189. Obtainable from the Superintendent of Documents, Washington, D.C. Price \$ 1.25.



**Rots of English Oak.\***—In the prefatory note it is stated that this is the first of a projected series of papers dealing with the fungi causing decay of the principal timber species.

The rots of oak are divided into three classes, those attacking the standing tree, those of felled and worked timber, and those occurring in buildings. Keys are given for the identification of the fungus according to the character of the rot. Under each heading the chief fungi concerned are described macroscopically, the gross and microscopic characters of the rot are given, growth of the fungus in culture and any physiological data are described, and finally the economic importance of the fungus is discussed. Fungi of minor importance are listed and briefly described. Finally there is a brief account of various stains and discolorations of oak wood, and a list of literature referred to. The paper is illustrated by 13 excellent plates, taken from photographs, showing cultures and fruit-bodies of some of the fungi, and various types of rot.

The work is a most useful summary of existing information as to the rots of oak, and its successors will be awaited with interest.

E. M. WAKEFIELD.

**Carnations.†**—This handbook, compiled by an acknowledged authority on this subject, opens with an informative chapter on the history and improvement of the various types of carnations and garden pinks. The cultivation of the different sections, from the initial stages of propagation to the final flowering, is then dealt with in such a clear and simple manner that beginners should have no difficulty in understanding the various cultural processes described. There are also chapters dealing with hybridising, seed raising, diseases, insect pests, greenhouses, and the preparation of the blooms for floral decoration and exhibition.

An interesting feature of the book is a series of short articles dealing with the cultivation of the carnation in no less than twelve different countries, each section being written by an expert in the particular country.

The book is profusely illustrated and well printed; it forms an attractive volume which is likely to be the last word on the subject for a good many years.

J. COUTTS.

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\* "The Principal Rots of English Oak." By K. St. G. Cartwright and W. P. K. Findlay. Published by H.M. Stationery Office, 1936. Pp. 38, 13 plates. Price 2s. net.

† "Carnations and All Dianthus." By Montagu C. Allwood, F.L.S., with a Foreword by Lord Aberconway, C.B.E., V.M.H. Allwood Bros., Haywards Heath, Sussex, no date [1935]. Pp. xxiv+215, 156 plates. Price 12s. 6d.